Technical Report 1178

Wargaming Effectiveness: Its Conceptualization and Assessment

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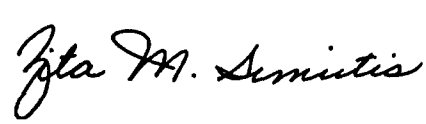

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14. ABSTRACT *(Maximum 200 words)*:

Wargaming arguably is the most important collective activity occurring during operational planning. The need to understand, develop, and support battle staff wargaming has never been greater than it is now. The purpose of the present research was to determine the constructs that comprise effective wargaming and to explore methods for assessing these constructs. Cognitive task analysis was used to develop a conceptual framework for understanding the knowledge, skills, and other attributes that comprise the individual and team-related determinants, processes, and outcomes of effective wargaming. This framework was used as the basis for designing and implementing assessments. This initial exploration indicates that assessments derived from the wargaming conceptual framework can be feasible to administer and be reliable and valid assessments of their related psychological constructs. If extended and applied, this work could escort operations command and control teams into the future through a better understanding of how to develop and support their collective mission planning competence.

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WARGAMING EFFECTIVENESS: ITS CONCEPTUALIZATION AND ASSESSMENT

EXECUTIVE SUMMARY

Research Requirement:

Battalions and brigades are experiencing substantial change in structure and identity as they transform to modular units of action. Among other things, this change has implications for how to apply the military decision-making process to planning unconventional missions using new types of units. Wargaming arguably is the most important collective activity occurring during operational planning. The need to understand, develop, and support battle staff wargaming has never been greater than it is now, when innovative problem solving is absolutely critical to success.

Developing and supporting the collective activity involved in wargaming requires that the outcomes of wargaming be well defined, that the processes by which successful wargaming occurs be well understood, and that the causes for ineffective wargaming be recognized. Assessment lies at the intersection of understanding wargaming and actually improving it through training or command and control system design. Without assessment, understanding wargaming cannot be linked to performance enhancement.

The collective activity involved in effective wargaming, however, is not well understood, and its assessment is largely unexplored. The understanding of wargaming effectiveness must go beyond current conceptualizations to illuminate the constructs that comprise effective wargaming. Assessment of wargaming effectiveness must go beyond current state-of-the-art to capture these constructs in a reliable, valid manner.

The purpose of the present research was to determine the constructs that comprise effective wargaming and to explore methods for assessing these constructs. The focus of the research was wargaming as conducted by the staffs of combined arms battalion task forces. The goal was to provide direction for conducting wargaming assessment for the purposes of tracking training progress and/or evaluating the effects of technological intervention on wargaming effectiveness.

Procedure:

Cognitive task analysis was used to develop a conceptual framework for understanding the knowledge, skills, and other attributes that comprise the individual and team-related determinants, processes, and outcomes of effective wargaming. This framework was used as the basis for designing and implementing assessments of individual and team wargaming competence. The validity and feasibility of these assessments was explored by administering the assessments during Armor Captain's Career Course (AC3) training between November 2004 and September 2005. Six independent groups of students participated in the research.

Findings:

This initial exploration of wargaming assessment methods indicates that assessments derived from the wargaming conceptual framework can be feasible to administer and be reliable and valid assessments of their related psychological constructs. In addition, these assessments are informative regarding the possible situational factors that influence wargaming performance, including the number of officers involved, the ease of communications, and the adequacy of supporting equipment. Further validation of wargaming effectiveness assessments requires a combined approach in which assessments are designed based on an understanding of wargaming, tested in a controlled experimental environment where specific conditions can be manipulated, and validated in an operational setting.

Utilization and Dissemination of Findings:

The present research produces a more in-depth understanding of wargaming and its effectiveness assessment than previously has been accomplished. Several psychological constructs comprising wargaming determinants (individual and team-related), processes, and outcomes have been identified. This work therefore sets the stage for more systematic assessment of wargaming effectiveness and diagnosis of shortfalls in wargaming performance. If extended and applied, this work could escort operations command and control teams into the future through a better understanding of how to develop and support their collective mission planning competence.

WARGAMING EFFECTIVENESS: ITS CONCEPTUALIZATION AND ASSESSMENT

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Introduction

As the U.S. Army goes through its greatest transformation since the 1960's (Smith, 2005) (a transformation necessitated by shifts in the nature of warfare and the fundamental mission of the Army) change over the next several years will effect every echelon in the organization. Battalions and brigades are experiencing the greatest change in structure and identity as they transform to modular units of action. Among other things, transformation has implications for unit employment tactics and therefore the "art" of mission command [*FM 6-0*; U.S. Department of the Army (DA), 2003]. Battalion and brigade commanders and their staffs must learn how to apply doctrinal concepts, such as the military decision-making process in new ways to plan unconventional missions and counter asymmetric enemies. Moreover, they must apply these concepts using new technology, specifically networked digital command and control systems. The need to understand, develop, and support the collective activity that comprises effective operational (i.e., battalion- and brigade-level) planning and decision-making has never been greater than it is in the contemporary operating environment, where innovative problem solving is absolutely critical to success.

Wargaming, the analysis of potential courses of action for their feasibility, risk, and likelihood of success (*FM 5-0*; DA, 2002), arguably is the most important collective activity occurring during operational planning. Effective wargaming not only accomplishes a systematic evaluation of candidate mission plans, but also serves to align the battalion or brigade commander's visualization of an upcoming engagement with that of his staff. This shared visualization is what enables staff officers to anticipate the commander's decision-making needs in the midst of an engagement and therefore provide him timely, relevant information or even make decisions in his absence. In addition, effective wargaming enables staff officers to develop integrated mission plans that synchronize their functional areas to achieve decisive effects. Mission plans do not apply fully after the enemy makes his first unpredicted action, but it is through the wargaming process that the commander and his staff internalize the overall purpose and goals of the mission as well as explore the implications of the operational environment for action.

Developing and supporting the collective activity involved in wargaming requires that the outcomes of wargaming be well defined, that the processes by which successful wargaming occurs be well understood, and that the causes for ineffective wargaming be recognized. Understanding the determinants (individual and team-related), processes, and outcomes of wargaming focuses the determination of training objectives or identification of behavioral targets for technological support. Assessment lies at the intersection of understanding wargaming and actually improving it through training or command and control system design. It is through assessment that progress toward training objectives can be tracked and facilitated. It is also through assessment that the effects of technology or other intervention on collective activity are revealed and evaluated. Without assessment, understanding wargaming cannot be linked to performance enhancement.

The purpose of the present research was to design, develop, and evaluate the reliability and feasibility of techniques for assessing wargaming effectiveness. The focus of this research was wargaming as conducted by the staffs of combined arms battalion task forces (CABTFs).

The goal was to provide direction for conducting wargaming assessment for the purposes of tracking training progress and/or evaluating the effects of technological intervention on wargaming effectiveness. The following quote from Messick (1994), as cited in Mislevy, Steinberg, Breyer, Almond, and Johnson (1999) precisely summarizes the overall approach used.

> "[We] would begin by asking what complex of knowledge, skills, or other attributes should be assessed, presumably because they are tied to explicit or implicit objectives of instruction or are otherwise valued by society. Next, what behaviors or performances should reveal those constructs and what tasks or situations should elicit those behaviors? Thus, the nature of the construct guides the selection or construction of relevant [assessment] tasks as well as the rational development of scoring criteria and rubrics. (p. 17)"

The knowledge skills, or other attributes comprising the collective activity involved in effective wargaming, however, are not well understood. Doctrine (*FM 5-0*; DA, 2002) and other sources (Ford & Campbell, 1997; Mullen, Kemper, Harrison, & Bartkoski, 1997) state the tasks that must be accomplished for wargaming to be considered successful, but do not identify the determinants (individual and team-related), processes, and outcomes of wargaming. If the tasks required for successful wargaming are accomplished, it is still unknown whether the desired outcome of wargaming has actually been achieved (e.g., a person may successfully hammer three nails into the wall and set a shelf upon them, but the shelf may be crooked, may not coordinate with the other décor in the room, etc.). If these tasks are not accomplished, it is unknown as to why there was a shortfall in performance.

For this reason, the present research also focused on developing a conceptual framework for understanding knowledge, skills, and other attributes that comprise the determinants, processes, and outcomes of effective wargaming. This framework served as the basis for designing, implementing, and evaluating assessments of individual and team wargaming competence. The reliability and feasibility of these assessments was evaluated through administration during Armor Captain's Career Course (AC3) training occurring between November 2004 and September 2005. This final report presents the research approach in detail, the assessments developed, and the findings of their evaluation. For the convenience of the reader, a list of all acronyms is provided in Appendix A.

A Cognitive Task Analysis of Wargaming

In order to identify the knowledge, skills, and other attributes that should be assessed to capture the wargaming effectiveness of CABTF staffs, a cognitive task analysis of wargaming was conducted. The objective was to identify not only the cognitive activities involved in effective wargaming, but also the behavioral indicators of effective performance of these activities. For this reason, the approach used combined applied cognitive task analysis (described in Militello & Hutton, 1998) with evidence-centered cognitive task analysis (described in Mislevy et al., 1999). This approach allowed the present assessment research to be based on a conceptualization of effective operational behavior in terms of psychological constructs, rather than on an a priori selection of psychological constructs that were force-fit to a poorly understood notion of operational behavior. Unlike either Militello, and Hutton (1998) or

Mislevy et al. (1999), the present task analysis focused on collective as well as individual cognitive activities. The task analysis was conducted in three phases: literature review, discussion with subject matter experts (SMEs), and observation of ongoing wargaming.

Literature Review

The task analysis began with a review of several unclassified Army field manuals on mission planning and tactics [e.g., *FM 5-0*; DA, 2002] such that a general understanding of the wargaming process could be accomplished. The documentation reviewed described the purpose of the wargaming process, its procedural steps, and the key people involved and their role in the process. Articles in the Army professional literature [e.g., Center for Army Lessons Learned (CALL), 1998], as well as a variety of publicly accessible Government-sponsored technical and research reports (e.g., Mullen et al., 1997), monographs (e.g., Glenn, 1996), and military student thesis (e.g., Crain, 1989), helped with identifying the particularly challenging aspects of wargaming. These aspects are successfully conducted by expert teams of wargamers and unsuccessfully by others. These aspects are also those of greatest importance to ensuring that the wargame achieves its purpose. A general understanding of the wargaming process and its challenging aspects prepared the principal investigator to interview SMEs for more in-depth information not readily available in the literature.

Interviews with Subject Matter Experts

Interviews with 17 SMEs were conducted to better understand why aspects of the wargaming process are difficult for CABTF staffs and to determine the individual and team activities that comprise effective wargaming. Interviewees included current and former observer/controllers at the U.S. Army National Training Center, active and retired lieutenant colonels with battalion command experience, instructors at the U.S. Army Command and General Staff College and at the U.S. Army Armor School, and two retired generals. All of these SMEs had experience as staff officers and as members and/or commanders of a combined arms unit. The interviews conducted were not structured around the probe questions presented in Militello and Hutton (1998) or Mislevy et al. (1999); the probes used by these researchers to capture decision-making activity were not relevant to analyzing an information-gathering task such as wargaming. Rather, the interviews in the present research started from the following general questions: (1) What makes [a particular aspect of wargaming] difficult? (2) What do staff officers have to know and/or do to [perform this particular aspect] successfully? (3) What mistakes do less experienced staffs typically make [when performing this aspect]? (4) What do these mistakes look like? (5) What does it look like when [this particular aspect] is performed effectively?

Observations

As a supplement to SME interviews in determining the indicators of wargaming effectiveness, observations were conducted of ongoing wargaming instruction and of wargaming conducted during a high-fidelity field training exercise. The wargaming instruction observed was conducted at the Armor School. Students were National Guard officers and regular Army officers participating in AC3. Regular Army students in the resident version of AC3 wargamed

together in a classroom using acetate overlays and paper maps. National Guard students in the distance-learning version of AC3 (AC3DL) wargamed while geographically distributed using a virtual tactical operations center (VTOC; see Sanders, 2002). The field exercise observed was conducted at the U.S. Army National Training Center. Brigade and armor task force planning was observed as these units went through stability and security operations training. All observations were conducted in collaboration with SMEs who provided explanation and insights in real time.

A Framework for Conceptualizing Wargaming Effectiveness

This section presents the findings of the cognitive task analysis in the form of a conceptual framework of wargaming. This framework served as the basis for the selection, design, and development of the wargaming assessments explored in the present research. The wargaming process is described briefly and a proposed set of knowledge, skills, and other attributes that comprise effective wargaming is featured. The task analysis revealed that essentially the same general competencies underlie both co-located and distributed wargaming, although technical skills become more important when communications are digitally mediated. Reference to wargaming throughout this report therefore refers both to co-located and distributed wargaming.

The Wargaming Process

Wargaming is a key component of Army mission planning. According to Army doctrine, it is the analysis of multiple courses of action in order to collect information on their feasibility and likelihood of success. After wargaming, the courses of action analyzed are compared and the superior course of action is chosen as the mission plan. The following description of the wargaming process is focused on wargaming as applied to planning in a time-constrained environment because interviews with SMEs indicated that this is the environment in which wargaming is commonly done. In a time-constrained environment, only a single course of action is analyzed.

The purpose of wargaming a single course of action is to synchronize the functional areas on the battlefield, or battlefield operating systems (BOS), for accomplishing the mission and to identify any weaknesses in the course of action that must be addressed. It is an interactive information-gathering exercise through which the staff and commander calibrate their image of the battlefield (a dynamic mental model of the battlefield and its contextual surroundings; Kahan, Worley, & Stasz, 1989) and determine the means for allocating resources to accomplish the course of action and its associated branches/sequels. The overarching goal of wargaming a single course of action is to develop a shared image of the battlefield among the commander and staff to produce detailed orders and to allow maximum flexibility in responding to enemy action during execution.

Figure 1 below depicts the input, process, and outcomes of wargaming. Wargaming is situated near the end of the military decision-making process (MDMP), so the figure represents wargaming in isolation of the MDMP steps that precede it and follow it. The present research

focused on wargaming, although the other steps of the MDMP--particularly mission analysis--are worthy subjects of similar study.

The cognitive task analysis revealed that staffs experience difficulty with multiple aspects of wargaming, which often precludes their ability to accomplish an accurate, shared, and flexible image of the battlefield. First, staffs have difficulty considering the implications of friendly and enemy action for the use/availability of personnel (e.g., casualties), resources (e.g., medical supplies, ammunition) and combat support (e.g., maintenance and fueling, retransmission). Neglect of these implications results in a plan that fails because it is not robust to the actual conditions of the battlefield. Second, staffs have difficulty considering the multiple possible enemy reactions to friendly actions. Plans based on the most likely or most deadly enemy course of action fail when the enemy follows an unexpected course of action. Third, staffs have difficulty recognizing decision points on the battlefield and their indicators. Neglect of decision points reduces the commander's ability to react to mission events in a way that is consistent with his overall intent and the mission plan. Fourth, staffs have tremendous difficulty synchronizing the BOSs such that the capability of each BOS is leveraged to achieve a decisive result. Poorly synchronized BOSs fail to achieve coordinated, overwhelming combat power and increase the risk of fratricide.

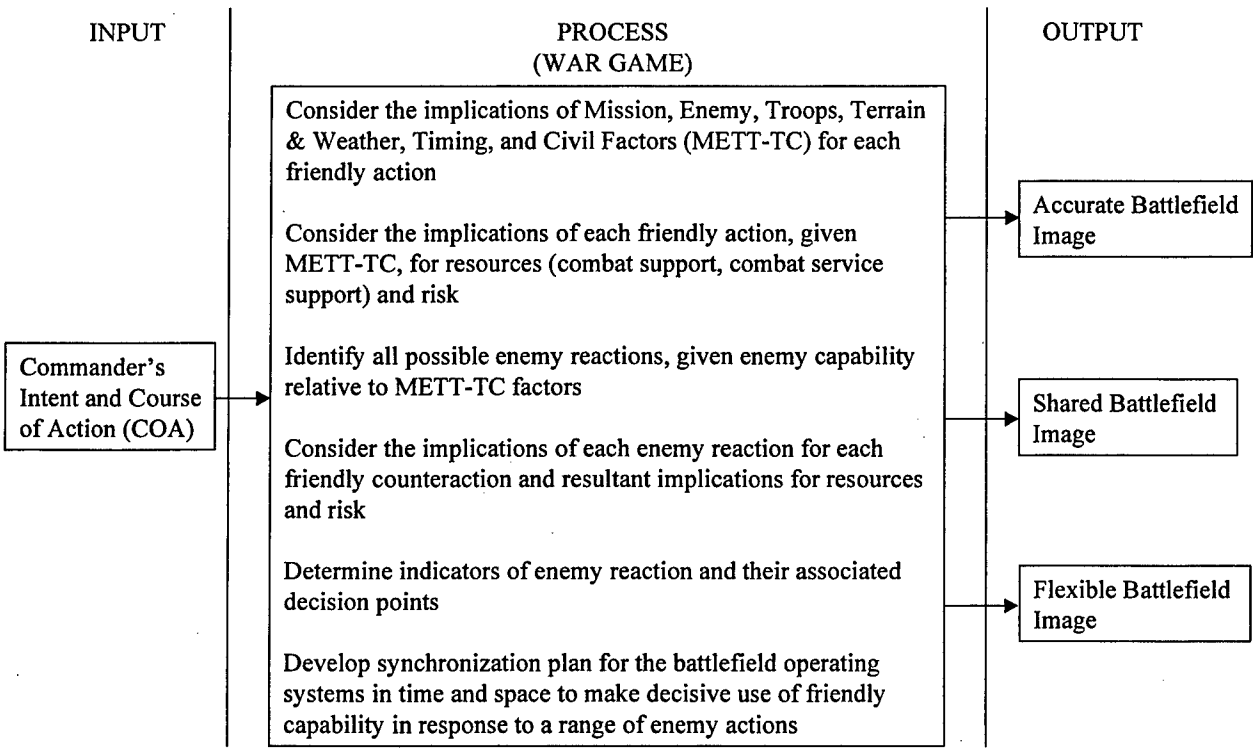

Figure 1. The Process of Wargaming a Single Course of Action.

The individual and collective competencies comprising effective wargaming process and outcomes are not well understood (though see Olmstead, 1992). That is, the tasks that should be completed for a war game to be considered successful are understood (Mullen et al., 1997), and the difficulty that staffs have with completing these tasks is well recognized (e.g., CALL, 1998,

2003), but it is less well known what the sources of difficulty are. The team training literature (e.g., Cannon-Bowers, Tannenbaum, Salas, & Volpe, 1995) was explored to gain an understanding of the individual and collective competencies that determine the effectiveness of the wargaming process and that reflect the execution of effective wargaming tasks.

Figure 2 shows the conceptual framework developed to characterize the competencies that comprise wargaming effectiveness. It is proposed here that these individual and collective competencies differentiate successful from unsuccessful wargamers as defined by the quality of their mission plan. This framework is not meant to present an exhaustive list of competencies. Rather, this selection of competencies reflects the belief in their importance relative to other competencies and a focus on competencies that can be modified through instruction or experience (i.e., organizational influences on wargaming effectiveness are excluded). The bolded competencies in the figure are those competencies selected for detailed study in this research. Each of these competencies is described below.

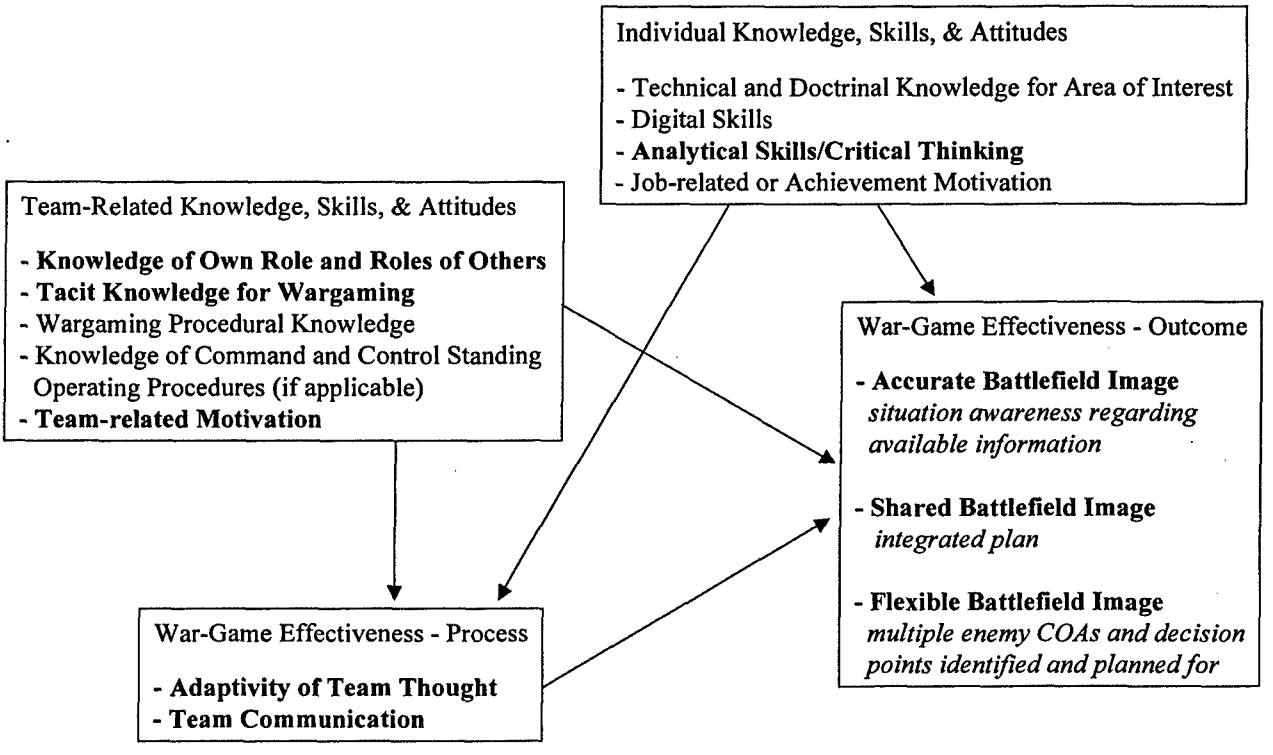

Figure 2. Determinants, Processes, and Outcomes of Effective Wargaming.
Note: Only bolded competencies were subjected to detailed study in the present research.

Determinants of Wargaming Effectiveness

Determinants of wargaming effectiveness are those individual and team-related knowledge, skills, and other attributes that serve as a foundation for effective wargaming process. Without sufficient development of wargaming determinants, wargaming process cannot be effective. In addition, determinants of wargaming effectiveness may contribute directly to effective wargaming outcomes. Some determinants, such as tacit knowledge for wargaming and wargaming procedural knowledge, may be developed through practice of wargaming. Other determinants, such as team-related motivation and analytical skills/critical thinking may be developed outside of wargaming experience. Described below are four determinants that were selected for further exploration in the present research.

Critical Thinking/Analogical Reasoning. The purpose of the staff during mission planning and execution is to gather and process information that the unit commander will use as the basis for his decision-making. The critical analysis of incoming information is challenging for staff officers (White, 2001). With the introduction of digital command and control systems, it is now more difficult and more important that they effectively analyze the volumes of incoming data and identify the specific implications of information for mission success (Langley, 2004). The ability to think critically/reason analytically enables staff officers to sift through incoming data with the commander's information requirements in mind, select relevant data for further analysis, and communicate information to the commander in a directed, timely manner. During wargaming, staff officers must think critically/reason analytically in order to communicate efficiently and effectively with one another and to keep wargaming activity focused on the commander's intent.

Knowledge of Own Roles and Roles of Others. During wargaming, the workflow of the staff is reciprocally interdependent (Tesluk, Mathieu, Zaccaro & Marks, 1997). That is, the staff officers involved each represent a different functional area (e.g., intelligence, air defense, etc.) and must work closely with one another to produce a refined mission plan that maximally leverages the capabilities in their area of interest. Staff officers contribute to refining the plan by reporting the implications of the current situation in their area of interest for how mission events will play out. Knowledge of one's own role and the roles of others on the staff enables staff officers to understand each other's information needs and to effectively meet those needs (Cannon-Bowers et al., 1995; Olmstead, 1992).

Tacit Knowledge for Wargaming. The procedure for conducting a wargame, and its desired outcome, is explicitly described in doctrine (FM 5-0; DA, 2002). However, conducting an effective wargame requires an understanding of the process that goes beyond knowing explicit procedure. Staff officers must understand the purpose of wargaming in order to engage in many of the tasks that are required for an effective war game. Specifically, they must understand that producing doctrinal wargaming products, such as the synchronization matrix, is not the goal of wargaming but a record of its results and that the quality of the results is dependent upon an integrated staff effort.

Tacit, or experience-based knowledge for wargaming provides staff officers with a more nuanced understanding of the wargaming process than is explicitly stated in doctrine, and

enables them to translate this understanding into action through more in-depth analysis during the war game. For example, a less experienced staff may estimate combat losses without further analysis because the estimate is enough to fill out a cell in the synchronization matrix. A more experienced staff would analyze what implications combat losses have for the commander's decision-making.

Team-Related Motivation. The ability of the staff to wargame effectively--to form a cohesive team and synchronize their efforts--is in part a function of the motivation of the individual team members to collaborate with one another and to create a team product of which everyone can be proud. Individual motivation to invest resources into team cohesion and synchronization stems from perceptions of the utility of performing well as a team, the utility of investing effort in improving team performance, and the relation between one's own effort allocation and team performance (Kanfer & Ackerman, 1989).

Motivation becomes an important determinant of performance when the application of additional effort to a task can produce performance gains (i.e., performance is resource-limited – it is not at ceiling or constrained by external forces; Kanfer & Ackerman, 1989). Wargaming is one task where performance is generally not at ceiling and motivation is required to work around the numerous external pressures against effective performance (e.g., turnover, command climate, battlefield chaos, etc.).

Effective Wargaming Processes

Effective wargaming processes are enabled when staff officers possess critical/analytical skills, recognize each other's information needs, understand the purpose of wargaming and are motivated to work together on a group product. Staff officers prepared in this manner will communicate better with one another and think more adaptively during the wargaming process. These wargaming processes are described in more detail below.

Team Communication

Because wargaming involves a reciprocally interdependent workflow (Tesluk et al., 1997), effective information sharing among staff officers is critical for producing a refined course of action. For each task that must be completed during a war game, staff officers must share specific information about their area of interest such that all functional areas are integrated into the refined plan. Effective information sharing eludes many staffs, with some staff officers (e.g., the Logistics Officer [S4]) routinely left out of the wargaming process.

Adaptivity of Team Thought

Automatized adaptive-thinking skills have been recognized as a critical aspect of expert command decision-making (Lussier, Shadrick & Prevou, 2003). Expert commanders are tuned into their environment and recognize the implications of particular environmental conditions for making rapid decisions in response to unforeseen events. Staff officers must anticipate unforeseen events during mission execution by evaluating during wargaming the same factors that the commander must consider when he makes decisions. In this way, wargaming supports

the commander's decision making by ensuring that the manpower and resources can be available when decisions must be made. Adaptivity of team thought among staff officers enables them to consider "What if?" on the basis of conditions present in the battle situation and to make contingency plans to address possible events during execution. This creates a flexible plan that is responsive to a range of mission events.

Effective Wargaming Outcomes

As stated previously, the desired outcome of wargaming is a refined plan and a shared visualization of the intended flow of battle and the triggers for the execution of contingency plans. This outcome stems directly from effective communication and adaptive thinking among the staff officers and indirectly from individual and team-related knowledge, skills, and attitudes. Evaluation of the quality of a particular wargaming outcome therefore involves assessing shared battle visualization and the degree to which the mission plan has integrated the capabilities of each staff officer's functional area.

Shared Battlefield Visualization

Shared battlefield visualization can be characterized as shared situation awareness ([SA], e.g., Endsley & Smolensky, 1998). It is (a) awareness of the mission plan elements and their locations (Level 1 SA); (b) understanding of how plan elements are synchronized in time and space and the implications of their success/failure for one another (Level 2 SA); and (c) projection of how these elements will function as the plan is executed and where key decisions will need to be made (Level 3 SA). Shared SA is a critical outcome of wargaming because it is the means by which the command and control team anticipate each other's actions during mission execution.

Integrated Mission Plan

The integrated mission plan maximally leverages the capabilities of each staff officer's functional area by synchronizing the efforts of each area in time and space. The integrated mission plan is a critical outcome of wargaming because its development requires careful consideration of the status and constraints of each functional area and the implications of these factors for how mission events can play out. This consideration enhances shared SA and reduces the risk of fratricide resulting from uncoordinated mission events.

Assessments of Wargaming Effectiveness

This section presents the assessments that were designed to capture all three aspects of wargaming performance (determinants, processes, outcomes). All assessments were designed in close collaboration with SMEs who provided input on the nature of the "test items" required to capture the psychological constructs of interest, shared insights regarding scoring rubrics and algorithms, and offered their opinions regarding the ability of the completed assessments to capture the construct they were intended to assess. All of the assessments were designed for administration either via computer or via paper-and-pencil administration.

Critical Thinking/Analogical Reasoning

To assess staff officers' ability to identify and communicate relevant information, an assessment was designed based on a classroom exercise developed by an instructor at the U.S. Army Command and General Staff College (CGSC). The exercise is used as an introduction to the Critical Reasoning/Creative Thinking course taught at CGSC. It is intended to stimulate students' understanding of their own ability to think critically and creatively under pressure. In this exercise, students are asked to review a set of 36 PowerPoint slides comprising a hypothetical mission analysis briefing. They are told that the briefing is too long and that they have 5 minutes to reduce the slides to 10 in order to communicate the most important information in the briefing.

This instructional exercise was adapted for assessment [and called the Mission Analysis Briefing Exercise (MABE)] by developing criteria for scoring students' abbreviated briefings. The score for this exercise is the number of slides in the abbreviated briefing containing relevant information divided by the total (reduced) number of slides (possible range = 0-1). Slides containing relevant information were determined in collaboration with the instructor who designed the exercise.

In the computer-based version of the MABE, students are told they must shorten the briefing to 15 slides and are given 15 minutes to complete the exercise. The computer-based version of the MABE was made slightly easier so that (a) individual differences in examinee familiarity with PowerPoint did not create differences in scores on the exercise; and (b) the exercise would not be so challenging for examinees that they disengaged from completing it. The CGSC instructor who created the exercise stated that students initially balk at the challenging exercise instructions and must be encouraged to continue. Because an instructor is not involved in the computer-based administration of the MABE, simplifying the exercise seemed a satisfactory alternative.

Knowledge of Own Roles and Roles of Others

The Staff Roles Knowledge Assessment was designed to capture examinee understanding of the information needs of core CABTF staff officers. The Staff Roles Knowledge Assessment has 42 items, each of which presents a key wargaming task that must be accomplished for the war game to be successful (see Mullen et al., 1997). Examinees are asked to indicate which of nine staff officers must share information in order to perform the task effectively. Some example items are shown below. The complete assessment is provided in Appendix B with correct answers indicated.

> Determine the command and control requirements for minimizing the effect of destruction of friendly command posts (CPs).
>
> □ XO □ S1 □ S2 □ S3 □ S4 □ SIGO □ FSO □ ADO □ ENG

Determine optimal employment of intelligence collection assets.

□ XO □ S1 □ S2 □ S3 □ S4 □ SIGO □ FSO □ ADO □ ENG

Identify triggers for the initiation of direct and indirect fires.

□ XO □ S1 □ S2 □ S3 □ S4 □ SIGO □ FSO □ ADO □ ENG

For each item, the score is the number of staff officers correctly identified minus the number of staff officers incorrectly identified (i.e., "false alarms"). The total score is the average of the *z*-scores for each of the 42 items (*z*-scores were used to ensure that all items comprising the total score were on the same scale). Answers to each item were determined by review of doctrine and SME input. The SME who provided input was among those who identified the key wargaming tasks on which the assessment is based.

Tacit Knowledge for Wargaming

To capture the level of development of examinees' understanding of the purpose of wargaming a short, five-question multiple-choice quiz was designed. Each question asks about the purpose of some aspect of wargaming. For example, one question asks:

> The wargaming process is conducted using multiple iterations of an action-reaction-counteraction (ARC) cycle. Why?
>
> a. The iterative ARC cycle involves a logical sequence of action.
> b. The iterative ARC cycle reveals the impact of timing on friendly and enemy action.
> c. The iterative ARC cycle supports wargaming both offensive and defensive battles.
> d. The iterative ARC cycle simulates how the mission will play out if the enemy follows a particular (e.g., most probable) COA.

To answer questions correctly, examinees must have an understanding of the purpose of wargaming that goes beyond what is explicitly stated in doctrine. Correct answers and distracters were determined by SME input. Distracters were designed to represent either common misconception regarding the purpose of wargaming or generic but not entirely relevant statements that can be found in doctrine. The score for this assessment is the number correct minus .25 times the number incorrect (possible range = -1.25 – 5.00). The entire Wargaming Tacit Knowledge assessment is shown in Appendix C with correct answers indicated.

Team-Related Motivation

To assess team-related motivation, a 12-item survey was designed in which examinees are asked to rate the truth of each item as Definitely True, Largely True, Depends, Largely False, Definitely False. Eight items were designed to capture examinees' perceptions of the utility of staff performance (e.g., "Staff positions provide experiences that are important for developing command skills."). One item was designed to capture examinees' perceptions of the utility of investing effort in improving team performance ("Staff performance can only be so good;

External factors (e.g., rapid staff turnover) exert a strong limiting influence."). Three items were designed to capture examinees' perceptions of the relation between individual investment of effort and the improvement of team performance (e.g., "Improved team cohesion is worth the effort involved in developing it."). The complete listing of the items in the Team-Motivation Survey is shown in Appendix D.

Team Communication

To assess team information sharing, two wargaming observation checklists were designed based roughly on the targeted acceptable responses to generated events or tasks (TARGETS) method (Fowlkes, Lane, Salas, Franz & Oser, 1994). Each checklist features a subset of tasks from the Staff Roles Knowledge Assessment, selected based on the likelihood of their occurring during the ongoing classroom wargaming that would be observed as part of the present research. Because two different wargaming mission scenarios were to be observed, the tasks in each checklist differ slightly depending on the nature of the scenario (offensive maneuver versus cavalry operations). Doctrine and SME review were used to identify the information that must be shared in order for each of the selected tasks to be completed effectively. An example wargaming task and its associated information-sharing requirements is shown below in Table 1 (for the complete checklists, see Appendix E).

Table 1

Example Item from a Team Communication Checklist

Task	Information Shared	Rating	Comments
Determine High Priority Targets	Templated location of the enemy and key enemy assets (e.g., artillery, C2 nodes)		
	Concept of maneuver		
	Re-supply rates for select munitions		

A key difference between the present checklists and a TARGETS checklist is that the occurrence of tasks to be observed using the present checklists is dependent on the team's effectiveness, rather than on the design of the team-performance situation (i.e., more effective teams would attempt more tasks). That is, in the TARGETS method, team-performance scenarios are carefully designed to present tasks that require team communication (e.g., an equipment malfunction). Raters then indicate whether the desired communication occurred. Because validation of the checklists involved observing ongoing classroom wargaming, special-purpose scenarios that would specifically elicit certain communication behaviors could not be used. Carefully selecting tasks that were likely to occur during student wargaming (routine targets) seemed a suitable alternative. This design allows capture of the completion of wargaming tasks independently from the effectiveness of team communication and provides a means for focusing observer attention--the primary advantage of using the TARGETS method.

A second difference is that the Team Communication checklists require a greater degree of observer judgment because ratings of information sharing were not binary (i.e., information shared/not shared). Raters use 0, .5 or 1 to indicate the degree to which information was shared. Similarly, each task is rated 0, .5 or 1 for its level of completion. A non-binary rating scale was used because teams can address a wargaming task (e.g., integrate maneuver with fire support) without necessarily completing it. In addition, teams could share some of the required information, but not all of it.

The Team Communications Checklists have three scores: a task score, an information-sharing score, and a total score. The task score is the average task rating for all tasks in the checklist (possible range = 0-1). The information-sharing score is the average sum of the average item ratings within each of task (possible range = 0-1). The total score is the sum of the task score and the information-sharing score divided by two (possible range = 0-1), representing a combined assessment of the accomplishment of wargaming tasks and team communication.

Adaptivity of Team Thought

To assess examinees' adaptive-thinking skills during the war game, two interactive observer checklists were created based on the Think Like a Commander (TLAC) training method (Lussier et al., 2003). Using the mission scenarios to be wargamed in the course sessions that would be observed, "What if?" questions about the mission were identified. Because two different wargaming mission scenarios were to be observed, the "What if?" questions in each checklist differ slightly depending on the nature of the scenario (obstacle breaching versus cavalry operations). Observers using a TLAC Checklist ask students these "What if?" questions during the war game. As examinees answer a question posed by the observer, the observer rates the quality of the examinee response on a scale of 0-2. Anchors for the rating scale were determined by SME input, with example "0-" and "2-quality" answers for each question provided to the observer. The score for the TLAC Checklist is the average of the question scores earned by the students (possible range = 0-2). An example question and its rating scale anchors are shown below in Table 2 (for the complete TLAC Checklists, see Appendix F).

Table 2

Example Think Like a Commander Checklist Item

Question	Example "0 Quality"	Example "2 Quality"
What cover and concealment can the enemy take advantage of in order to deceive 1-22 CAV regarding the size/strength of threat forces?	Solutions that do not include consideration of local populace	Use the civilian population to blend into the terrain
	Solutions that do not consider the effects of urban terrain	Maximize the use of forces within urban areas where intelligence collection and communication capabilities are weakened for U.S. forces
	Solutions that are not based on fighting an asymmetric enemy (e.g., students think in terms of large units, heavy equipment, etc.)	Disperse widely, remain in small teams, and move frequently such that effective estimates require an integrated intelligence effort

Shared Battlefield Visualization

To assess shared SA as a wargaming outcome, an exercise based on an Army doctrinal wargaming product called a decision support matrix (DSM) was devised. The DSM requires staffs to consider where on the battlefield the commander will have to make a decision during mission execution, what information he needs to make those decisions, and the options available to the commander at the time of decision-making. As shown in Table 3, the SA Exercise requires examinees to answer questions associated with elements of the DSM, which correspond to each level of SA.

Table 3

Example Situational Awareness Exercise Questions

SA Level	Question
1	What is the center of mass for Named Area of Interest (NAI) 3?
2	If the enemy strongpoint is located forward on high ground at NAI 3, what would this reveal about what the enemy intends to do?
3	What should Task Force (TF) 1-93 do if the eastern enemy strongpoint is located forward on high ground?

Only one of the wargaming mission scenarios used in the courses to be observed was selected as the basis for the SA exercise questions. With the help of subject matter experts, an exercise "key" was developed to score student wargaming outcomes. The entire set of questions comprising the exercise and the scoring key are shown in Appendix G. The individual score for this exercise is the sum of correct answers, weighted according to the level of SA required to answer the question correctly (possible range = 0-30). The team score for this exercise is the percent agreement on *correct* answers for each question (possible range = 0-15).

Integrated Mission Plan

To assess the level of integration of the mission plan, an Integrated Overlay Exercise was designed based on one of the wargaming mission scenarios used in the courses to be observed. In this exercise examinees are asked after they complete the war game to create a graphical overlay of each phase of the refined mission plan. The overlay is to contain the key elements of friendly activity not represented in the course of action sketch used as input for the war game (i.e., the activity determined during wargaming), including logistical assets and control measures. Upon completing the overlay, examinees are asked to brief the overlay to an observer, providing a rationale for the placement of each element.

Examinees earn one point for each element they include in the overlay (max = 21), compared to a "key" created by an SME. The observer rates examinee rationale for each element using a checklist in which the components of rationale for each element are listed. An example element and its rationale components are shown in Table 4. The score for each element is the proportion of the total number of rationale components provided by the student (possible range = 0-1). The score for the exercise is the number of elements included in the overlay

divided by the sum of the element rationale scores (possible range = 0-1). The complete list of elements and rationale components is provided in Appendix H.

Table 4

Example Integrated Overlay Checklist Item and Rationale

Element	Rationale Component
Smoke	Smoke at this location will mask TF 1-93 maneuver and protect movement to attack positions
	Smoke location is coordinated with S2 projections for weather/wind direction

Evaluation of Selected Wargaming Effectiveness Assessments

The above-described assessments of wargaming effectiveness can be considered valid if they reliably capture the constructs they are intended to capture. That is, the assessments must (a) demonstrate, where applicable, psychometric soundness; and (b) differentiate between more and less capable wargamers as identified by independent criteria. This section presents the approach used in the present research for exploring the validity of the assessments. Findings are also presented and discussed.

Method

Participants. Participants were 49 students in the AC3DL, taught through the U.S. Army Armor School at Fort Knox, KY. These students were first lieutenants (LT) (approximately[1] 37%), captains (CPT) (approximately 55%), and one major (MAJ) in the U.S. Army National Guard. In addition, two AC3DL students were civilians with prior Army experience who were taking the course as part of a job requirement. Slightly older than their counterparts in the regular Army, the AC3DL students were, on average, approximately 35 years old. Ninety-seven percent (37/38 – see footnote #1) of them were male. Approximately 75% of the National Guard officers in the course were armor officers, the rest were air defense artillerymen, engineers, infantrymen, military intelligence officers, and signal officers. Participation in the research occurred as part of the students' ongoing coursework.

Materials. Of the wargaming effectiveness assessments developed, all but the Integrated Overlay Exercise were administered to participants. The technical development required to implement this exercise was beyond the scope of the present research. A short demographic survey was also administered (see Appendix I). All materials that were not observer checklists (i.e., the demographic survey, MABE, Staff Roles Knowledge Assessment, Wargaming Tacit Knowledge Assessment, Team-Related Motivation, SA Exercise) were administered via the computer either as a Microsoft Word or PowerPoint file sent via email or as a web-based form.

[1] Eleven students did not fill out a demographic survey so overall participant data are approximate.

Procedure. All materials were administered as part of the students' ongoing coursework in the AC3DL. The purpose of AC3DL is to teach junior National Guard officers the fundamentals of the MDMP and basic company command skills. As shown in Table 5 below, the AC3DL is taught in multiple phases (see Sanders, 2002 for a complete description of this course).

Table 5

Overview of the Armor Captain's Career Course (Distance Learning)

Phase I - Distributed		Phase II – Co-located
Distributed/Self-Study	Distributed/Collaborative	
24 Internet-based modules covering brigade and battalion staff skills and company team operations	7 sessions to practice the steps of the MDMP as a battalion staff using instructor-generated materials (e.g., brigade operations order, commander's intent, etc.)	Two-weeks practice using the MDMP in the context of a fast-paced plan-prepare-execute cycle, using different instructor-generated materials

The present research involved assessment of student wargaming during Phase I – Distributed/Collaborative and Phase II of the course. Phase I – Distributed/Collaborative is comprised of seven sessions conducted in the VTOC. The VTOC allows geographically distributed students to work collaboratively using text chat, voiceover Internet protocol, and document sharing. During the seven distributed/collaborative sessions, students are each assigned a CABTF staff duty position, and practice developing a mission plan and troop leading procedures using the MDMP. Mission plans generated by students are based on instructor-generated materials that include a brigade operations order and commander's intent, graphical overlays, etc. Students who pass Phase I of the course continue on to Phase II, spending two weeks at Fort Knox to complete their training as a co-located group. Phase II involves further practice using the MDMP in the context of a fast-paced plan-prepare-execute cycle of activity.

Students conduct wargaming during the fourth session of the distributed/collaborative phase of training and during the co-located resident phase. Each of the two wargaming events involves a different mission scenario. The scenario used during the distributed/collaborative phase involves a mechanized infantry task force (TF 1-93), whose mission is to draw an enemy combined-arms reserve element away from an adjacent friendly task force as it attempts to seize a key objective. The scenario used during the co-located phase involves a reconnaissance, surveillance, and target acquisition (RSTA) squadron (1-22 CAV), whose mission was to perform reconnaissance to assist a Stryker brigade combat team commander in determining which of three courses of action to pursue. Because the distributed/collaborative and co-located phases of instruction involve the use of different mission scenarios, the administration of scenario-based assessments was determined in part by the phase of instruction students were in at the time of data collection.

Assessments of wargaming determinants (MABE, Staff Roles Knowledge Assessment, Wargaming Tacit Knowledge Assessment, Team-Related Motivation) and the demographic

survey were administered prior to student wargaming. Assessment of wargaming process effectiveness (Team Communication Checklist, TLAC Checklist) was conducted during student wargaming. Assessment of wargaming outcome effectiveness (SA Exercise) was administered after student wargaming was completed. As an independent assessment of wargaming effectiveness, instructors were asked after wargaming was over to rate each group of students on the quality of their wargaming performance relative to doctrinal standards (Poor/Fair/Good/Excellent) and relative to other student groups (Below Average/Average/Above Average).

Approximately five classes of the AC3DL are taught per year by two instructors. The 49 students who participated in the present research were members of six independent groups of students who were enrolled in AC3DL between November 2004 and September 2005 (see Table 6 below). Three of these groups went through both the distributed/collaborative and resident phases of the AC3DL during the time data were collected. The composition of these groups changed slightly between the distributed/collaborative and resident phases of instruction, with students who missed their assigned resident phase (e.g., due to deployment) attending a later resident phase. The remaining groups of students went through either the distributed/ collaborative or the resident phase of AC3DL during the time data were collected.

Table 6 below shows the assessments that were administered to each student group. Due to time constraints, none of the three student groups who went through both the distributed/collaborative and resident phases of the AC3DL during the present research was given the same assessment twice. Due to technical and other constraints some assessments were administered only to some groups. A complete explanation of why some groups did not receive particular assessments is provided in the next section.

Table 6

Overall Administration of Wargaming Effectiveness Assessments

Group	Instructor	Learning Environment	Assessments Administered
1	A	VTOC (TF 1-93)	Not Applicable (N/A)
1	A	Classroom (1-22 CAV)	Demographic Survey, Staff Roles, Wargaming Tacit Knowledge, Team Communication Checklist (1-22 CAV)
2	B	VTOC (TF 1-93)	Demographic Survey, MABE, Staff Roles, Wargaming Tacit Knowledge, Team Communication Checklist (TF 1-93)
2	A	Classroom (1-22 CAV)	TLAC Checklist (1-22 CAV)
3	A	Classroom (1-22 CAV)	Demographic Survey, Staff Roles, TLAC Checklist (1-22 CAV)
4	A	VTOC (TF 1-93)	Demographic Survey, MABE, Staff Roles, Wargaming Tacit Knowledge, Team Communication Checklist (TF 1-93), SA Exercise
4	A	Classroom (1-22 CAV)	TLAC Checklist (1-22 CAV)
5	B	VTOC (TF 1-93)	Demographic Survey, MABE, Staff Roles, Wargaming Tacit Knowledge, Team Communication Checklist (TF 1-93), SA Exercise
6	A	VTOC (TF 1-93)	Demographic Survey, Staff Roles, Wargaming Tacit Knowledge, Team Communication Checklist (TF 1-93), SA Exercise

Findings

Assessment Properties. This section summarizes, where applicable, the psychometric and other properties of each assessment administered as part of the present research, including the feasibility of its administration.

Mission Analysis Briefing Exercise (MABE)

The MABE was administered only to distributed/collaborative phase student groups in order to minimize the course interruption caused by research data collection. Administration of the MABE in the classroom setting would have required the students to do the exercise as a group, proctored and timed by the instructor or an experimenter. This was determined to be too disruptive to the flow of classroom activities and likely to reduce student motivation to perform well during the exercise. Web administration of the MABE using the VTOC allowed students to do the exercise individually with the instructions and timing accomplished by the computer. Group 1 was not administered the MABE or any other assessments due to the high level of difficulty this group of students had with the course materials.

The MABE therefore was administered to three student groups totaling 16 participants. However, only five students completed the MABE. The MABE proved difficult to administer due to limitations in the Internet speed available to most students in the distributed/collaborative phase of instruction. That is, to complete the exercise using the VTOC, students had to download the PowerPoint briefing onto their personal computers in order to modify, save it, and upload it in the time allowed. The 15-minute exercise timer starts when the download of the briefing is initiated and ends when the upload of the modified briefing is completed. Students with slow Internet speeds were unable to complete this process in the time allowed and became frustrated with their lack of control in successfully completing the exercise. For this reason, the MABE was not administered to Group 6, the final distributed/collaborative student group observed in this research.

Among the five students who completed the MABE, scores ranged from .52 to .64, with three students earning a .64. These findings, albeit limited in scope, suggest that range restriction may be a problem when administering the MABE to larger groups. This problem could be solved in one of two ways. First, the scoring method could be changed. That is, rather than simply summing the number of slides in the abbreviated briefing containing relevant information and dividing by the total (reduced) number of slides, a weighted sum of the slides containing relevant information could be derived and divided by the total (reduced) number of slides. The weighting scheme could be determined by the relative importance of the relevant-information slides present in the reduced briefing. Such a change to the scoring method could be effective because although students tended to reduce the briefing to roughly the same number of relevant slides (8-11), they often selected different slides to include.

Second, the content of the slides in the unabbreviated briefing could be modified to reflect more systematic design of the assessment itself. The learning exercise on which the MABE was based was not intended as an assessment. For this reason, it was not designed specifically to reveal individual differences in critical thinking/analytical reasoning, but simply

to raise awareness about what critical thinking/analytical reasoning "feels like." Redesign of the MABE would require identifying the indicators of different levels of critical thinking/analytical reasoning as they relate to the information that could be present in a mission analysis briefing. For example, students with less well-developed levels of critical thinking/analytical reasoning might know to *include* slides containing such relevant information as risks or recommendations but might not know to *exclude* slides that present weather/illumination data without interpretation.

Staff Roles Knowledge Assessment

The Staff Roles Knowledge Assessment was administered to all six student groups, with 37 of 49 students completing it. Distributed/collaborative phase student groups took the assessment using a web-based form available in the VTOC. One student did not complete the assessment due to technical difficulties with the VTOC. Co-located student groups who had not already taken the Staff Roles Knowledge Assessment in the VTOC filled out a Microsoft Word file emailed to them by their instructor. Eleven students who were not present in a distributed/ collaborative wargaming session observed during data collection but were present for resident-phase wargaming did not complete the Staff Roles Knowledge Assessment. The Staff Roles Knowledge Assessment was easy to administer and took relatively little student time to complete.

In initial pilot testing, the split-half reliability of the Staff Roles Knowledge Assessment was quite high (r_{xx} = .94), so the assessment was reduced by half in order to ease the workload on students. The internal-consistency reliability of the reduced assessment is also high, at .85. The range in total scores on the Staff Roles Knowledge Assessment was -.82 to .87, with a mean and standard deviation of .00 and .51, respectively. This range in scores suggests that the Staff Roles Knowledge Assessment is capturing individual differences, and is not subject to a floor or ceiling effect.

Response-accuracy patterns in the Staff Roles Knowledge Assessment mirrored those patterns expected on the basis of known deficiencies in staff information sharing. That is, on average, students most accurately identified the information needs of the operations officer and the intelligence officer, who are a central focus of the wargaming process (mean percent correct for these officers was, respectively, 35 and 13 percentage points above the mean percent correct for all officers, which was 35). The information needs of other staff officers, i.e., those representing functional areas that deal with combat support and combat service support, were poorly understood by the students who participated in the present research, just as they are not well understood by many combat arms officers in general (CALL, 1998). The mean percent correct for these officers was, on average, nine percentage points below the mean percent correct for all staff officers.

An additional, seemingly counterintuitive finding is that students were least accurate in identifying the information needs of various staff officers during the wargaming of maneuver and intelligence tasks (mean percent correct was 32 and 35, respectively) and most accurate in identifying the information needs of various staff officers when wargaming combat support tasks (mean percent correct for fire support, maneuverability/survivability, and combat service support

tasks was 47, 44, and 44, respectively). This pattern of accuracy actually is expected when one assumes that students were more likely to neglect the information needs of other staff officers when completing wargaming tasks in their area of expertise. Most of the students in the AC3DL were armor officers, those officers who, when inexperienced, are more likely to underestimate the information needs of staff officers not directly involved with maneuver. In addition, the combat support wargaming tasks included in the Staff Roles Knowledge Assessment generally involved fewer staff officers whose role in wargaming the task was more obvious. This condition made it easier to correctly identify most or all of the staff officers involved in the task.

Wargaming Tacit Knowledge

The Wargaming Tacit Knowledge Assessment was administered to five of the six student groups, with 26 of 38 students completing the assessment. As with the Staff Roles Knowledge Assessment, distributed/collaborative-phase student groups took the Wargaming Tacit Knowledge Assessment using a Web-based form available in the VTOC. One student did not complete the assessment due to technical difficulties with the VTOC. Co-located student groups who had not already taken the Staff Roles Knowledge Assessment in the VTOC filled out a Microsoft Word file emailed to them by their instructor. Eleven students who were not present for a distributed/collaborative wargaming session observed during data collection but were present for resident-phase wargaming did not complete the Wargaming Tacit Knowledge Assessment. Group 3, which wargamed before this assessment was completed, was not administered the assessment. This assessment, like the Staff Roles Knowledge Assessment, was easy to administer and took little student time to complete.

Scores on the Wargaming Tacit Knowledge Assessment ranged from -1.25 to 5.00, the widest range possible, with a mean and standard deviation of 1.63 and 1.53, respectively. The internal consistency reliability of this assessment was .36. This estimate is quite low given the quiz is intended to assess a single construct. However, the quiz is only five questions long and the length of an assessment has implications for its reliability. When the Spearman-Brown formula is used to determine what the reliability of the Wargaming Tacit Knowledge Assessment would be if it was as long as the abbreviated Staff Roles Knowledge Assessment (21 items), the reliability is satisfactory at .70.

Team-Related Motivation

The Team-Motivation Survey was administered to all six student groups, with 32 of 49 students completing it. Distributed/collaborative phase student groups took the survey using a Web-based form available in the VTOC. One student did not complete the survey due to technical difficulties with the VTOC; three students did not complete the survey for unknown reasons. Co-located student groups who had not already taken the Team-Motivation Survey in the VTOC filled out a Microsoft Word file emailed to them by their instructor. Eleven students who were not present for a distributed/collaborative wargaming session observed during data collection but were present for resident-phase wargaming did not complete the Team-Motivation Survey. Two students did not fill out the survey for unknown reasons. It is possible that these two students overlooked the survey, as it was appended to the end of the demographic survey in

the MS Word file sent by the instructor. The Team-Motivation Survey was easy to administer and took relatively little student time to complete.

Table 7 below shows the percent of responses to each survey item that indicate positive levels of motivation. That is, for items 1, 2, 4, and 7-10, the percentage in the right hand column of the table indicates the proportion of students selecting "Largely True" or "Definitely True" as their response to the item. For the remaining items, the percentage indicates the proportion of students selecting "Largely False" or "Definitely False." As can be seen in the table, several items are positively endorsed by all or nearly all of the students participating in the present research. One exception is Item 12, which a large majority of students (81%) endorsed negatively. At a general level, these results suggest that students are motivated to perform well as staff officers and feel that staff officers are important in aiding the commander. However, the students also appear to feel some lack of control over the quality of staff performance, that efforts devoted to team cohesion are not as important as efforts devoted technical self-development, and that staff positions carry less prestige than command positions.

Table 7

Percentage of Students Positively Endorsing Motivation Survey Items

Item	Positive Endorsement
1. Staff positions provide experiences that are important for developing command skills.	88%
2. Good performance in a staff position is required for promotion to command.	66%
3. Great staff members don't make history; Great commanders do.	34%
4. Superior staff performance is a source of pride for individual staff members.	91%
5. Good commanders don't need a staff to aid in planning; They can already visualize the battlefield and act decisively.	94%
6. Staff performance is not a major factor in determining battle outcomes.	94%
7. Technical knowledge (including doctrine and digital skills) is critical for superior staff performance.	94%
8. Improved technical knowledge is worth the effort involved in acquiring it.	100%
9. Team cohesion is a critical characteristic of superior staffs.	100%
10. Improved team cohesion is worth the effort involved in developing it.	100%
11. There is higher payoff for investing effort to acquiring technical knowledge than for investing effort in developing team cohesion.	47%
12. Staff performance can only be so good; External factors (e.g., rapid staff turnover) exert a strong limiting influence.	19%

To examine individual differences in team-related motivation, students' item endorsements were recoded to a numerical, 0-4 scale in which 4 indicates the highest level of

motivation and 0 the lowest. The highest level of motivation could be a "Definitely True" or "Definitely False" selection, depending on the question. Team-related motivation "scores" derived in this manner ranged from 28 to 45 (possible range is 0-48), with a mean of 36.47 and a standard deviation of 4.02. In general, it appears that students had moderate to high levels of motivation as captured by the survey, and that there was relatively limited variance among individuals in level of motivation.

The internal-consistency reliability of the Team-Motivation Survey was .68. When the four items referring to the prestige of staff positions (Items 2 and 3), the utility of investing in team cohesion (Item 11), and the relation between effort investment and staff performance (Item 12) are removed, the internal-consistency reliability is .79. This increase in reliability suggests that although the survey is not capturing two distinct aspects of team-related motivation, it is perhaps capturing a distinction that respondents make between the importance of staff function and expertise and the reality of its development, recognition, and payoff.

Team Communication Checklist

Five student groups (four distributed/collaborative and one co-located) were observed for the quality of their information sharing using one of two Team Communication Checklists. The total communication score (the combined average of task scores and information sharing scores) can range from 0 to 1, reflecting both the degree to which information is shared, and also the level of wargaming task completion. In the present research, group total scores ranged from .28 to .53, with a mean of .36 and a standard deviation of .11. Task scores, which reflect only the level of task completion, ranged from .41 to .67 (possible range is 0-1), with a mean of .50 and a standard deviation of .11. Information sharing scores, which reflect the degree to which essential task information is shared, ranged from .09 to .38 (possible range is 0-1), with a mean of .22 and a standard deviation of .12. These scores indicate that there was some limitation in range of student group performance (3 of 5 total scores were .28-.29; 3 of 5 task scores was .41-.46), but that performance was neither at floor or ceiling. Performance was generally low and information sharing (i.e., information sharing scores) tended to be quite spare, albeit variable.

Where two raters used the Team Communication checklist, they agreed on 67% of the judgments that a wargaming task had been attempted. The correlation of the scores they assigned to each task was .54. Similarly, these same two raters agreed on 77% of the judgments that an attempt to share a particular piece of information occurred. The correlation between the scores they assigned to information sharing was .69. Differences among the two raters appear to come from differing levels of experience observing AC3DL wargaming and differing levels of familiarity with the doctrinal information requirements for each wargaming task.

Notably, task scores were substantially higher than information scores, indicating that students were attempting wargaming tasks, but generally not sharing sufficient information to complete the tasks according to doctrinal and expert standards. This appears to have occurred for two reasons. First, students, particularly those in the distributed/collaborative phase of instruction, tended to conduct wargaming with the goal of filling out the synchronization matrix used to record wargaming results, rather than the goal of refining the plan. This focus on recording results as opposed to refining the plan appears to have occurred in part because the

course instructors use a completed portion of the synch matrix to introduce students to the wargaming process. They brief the initial, completed portion of the matrix (Phase I of the operation), but do not model how that portion is derived. The consequence is that students perform several of the tasks listed in the Team Communication Checklist, but only to the extent required to fill in the synchronization matrix. This can be accomplished without thinking more broadly about refining the plan and to a large extent without communication.

Second, students do not have the technical means (i.e., through simulation) or experience to really *visualize* the mission, to think in detail. For example, they will determine the priority of air defense coverage as "area coverage," but generally do not get more specific than that (i.e., what the basis for that determination is, other than that "area coverage" is specified in the brigade operations order that is part of the mission scenario). Students would decide air defense coverage without ever discussing what units, specifically, were going to be covered and how to use coverage to mass combat power.

Support for these ideas comes from the fact that co-located student wargaming, in which the recording technique was less central and there was better simulation of actual operational conditions, earned a substantially higher task and information sharing score than all of the distributed wargaming observed. Yet, even co-located wargaming was not optimal (task score = .67, information sharing score = .38). It is possible that co-location generated or at least contributed to better performance. However, observation of student behavior in both conditions suggests that communication differences were most likely due to a greater ability to conceptualize the purpose of wargaming through greater focus on refining the plan and better simulation of operational conditions. The relative veracity of these two explanations remains to be tested. In any case, these findings suggest that the Team Communication Checklists are useful for understanding more fully what was happening during wargaming. In the present research, they were sensitive to limitations in the technical and experiential support that students needed to wargame optimally.

The Team Communication Checklists were equally unobtrusive during distributed and co-located observation. One challenge encountered when using the checklist was identifying who was sharing information. During distributed observation, it was often difficult to tell who was speaking and, consequently, what staff role they were playing during the war game. In both distributed and co-located wargaming, students often played more than one staff role or staff roles went unfilled due to lack of students (e.g., one group had only three students). For these reasons, it turned out to be unproductive to attempt tracking who was communicating relative to who should be communicating according to doctrinal standards.

Think Like a Commander (TLAC) Checklist

Three student groups, all co-located, were observed using the TLAC Checklist. Distributed/collaborative student groups were not observed using the TLAC Checklist because students during this phase of instruction experienced great difficulty with the wargaming process due to inexperience and technical difficulties with the VTOC. It was determined that it would be too disruptive to the students to ask them probe questions during wargaming, especially since

they seemed highly unlikely to be able to answer the questions effectively, given their lack of experience.

Scores on the TLAC Checklist, derived by averaging the quality of student responses to checklist probe questions during wargaming, could range from 0-2. Group scores on the TLAC Checklist in the present research ranged from 1.17 to 1.71, suggesting a possible restriction of range. However, the wargaming of all student groups observed was rated as "above average" by their instructor (Instructor A for all three groups), which suggests that the range restriction on the TLAC Checklist may accurately reflect range restriction in student achievement. Inter-rater reliability for the TLAC Checklist was not assessed, due to the lack of secondary raters present during the observation of co-located wargaming sessions.

As with the Team Communication Checklists, the TLAC Checklist was largely unobtrusive during co-located observation. Students found the probe questions interesting and were more than willing to answer them during wargaming. However, concerns about disrupting the class led to the decision not to ask the probe questions to the student groups as a whole but to individuals in the group, one at the time. Although this approach bears greater similarity to the adaptive-thinking training approach described in Lussier et al. (2003), it does not truly capture the *collective* adaptivity of team thought, even though individual student scores are averaged to create a group score.

Situation Awareness (SA) Exercise

The SA Exercise was administered to three student groups, all distributed/collaborative, with 12 of 15 students completing the exercise. Three students did not complete the exercise due to technical difficulties with the VTOC. The SA Exercise was not administered to co-located groups because the course of action statement/sketch to be used during wargaming was necessary to design the SA Exercise and one was not available for the 1-22 CAV mission scenario. That is, student groups in the distributed/collaborative phase of instruction each tended to derive the same course of action from the TF 1-93 scenario, but students in the co-located phase of instruction did not (there was more detailed commander's guidance in the TF 1-93 scenario than the 1-22 CAV scenario). The SA Exercise was derived from a course of action created by distributed/collaborative students who were observed early in data collection and who were rated as good wargamers by their instructor. For this reason, the first two groups of distributed/collaborative wargamers observed were not administered the SA Exercise.

The average individual score on the SA Exercise was 4.00, with a range of 0.00 to 7.00. The average team score was 1.50, with a range of .67 to 2.01. Given the possible range in both individual and team scores of 0 to 30, the present scores hover close to floor. This is not surprising, given that (a) even experienced staffs have trouble deriving a decision support matrix (on which the SA Exercise is based) from the wargame; and (b) the students in the present research were very inexperienced. As an illustration, every student group observed was collectively confused about the basic doctrinal distinction between a decisive point (a point on the battlefield where decisive results must be achieved) and a decision point (a point on the battlefield where a decision must be made).

Simplifications of the SA Exercise could involve reducing the questions to include only Level 1 SA (i.e., questions that require students to identify elements of the present situation). The assumption behind this approach is that Level 1 SA is not dependent on Level 2 and Level 3 SA, which is an untested and possibly faulty assumption in the case of wargaming. That is, in order to determine the elements of a mission plan, wargamers must already know their implications and associated future activities. A second possibility would be to conduct the assessment interactively with the level of interactivity decreasing as the effectiveness of student responding increases. Recall that the SA Exercise has five clusters of three questions with each question in a cluster corresponding to one of the three levels of SA. In this situation, the instructor would begin by asking the student(s) the Level 1 SA question featured in the first cluster, probe students to think collaboratively until a shared, accurate solution is reached, facilitate student identification of the causes of inaccuracies, then move on to the next level of SA in that cluster. As students demonstrate improved collaborative thinking processes and SA, the instructor would gradually remove himself from the process, letting the students answer the remaining questions on their own. The assessment conducted in this manner initially would show low levels of responding, but could serve as a useful educational tool that would improve levels of responding on later portions of the assessment.

Instructor Ratings

Two instructors assigned quality ratings to student wargaming, however, no student group was rated by both instructors. Collectively, the instructors used the entire scale of ratings (i.e., Poor to Excellent, Below Average to Above Average) to characterize student performance. Although it could not be evaluated formally, Instructor B appears to have been slightly harsher in his ratings than Instructor A. In addition, instructors rated student wargaming during the resident phase of instruction higher than they rated student wargaming during the distributed/collaborative phase. Student groups during the resident phase were rated either as "good" or "excellent" and "average" or "above average," whereas groups during the distributed/collaborative phase were rated as either "good," "fair," or "poor" (4 of 5 "fair" or "poor") and "average" or "below average."

Assessment Validity. This section summarizes the relation of each assessment to one another, together with the implications of these relations for assessment validity and the validity of the wargaming framework more generally.

Relationships among Individual and Team-Related Wargaming Determinants

The wargaming framework posits several possible individual and team-related determinants of wargaming process and outcome effectiveness. The relative importance of these determinants in accounting for individual or group differences in wargaming effectiveness is a function of the degree of overlap among these determinants. That is, if the determinants are highly related to one another, any one determinant is less useful for accounting for performance. Therefore, the relation among wargaming determinants presented in the framework is expected to be low to moderate.

Of the determinants presented in the framework, four were selected for the development of assessments, and three of these assessments (the Staff Roles Knowledge Assessment, the Wargaming Tacit Knowledge, Assessment, and the Team-Motivation Survey) were completed by 10 or more students. In addition, several demographic variables were assessed. Evaluating the relation between the wargaming determinant assessments and demographic variables sheds light on the construct validity of the assessment scores. The following four tables summarize the scores on the assessments of wargaming determinants as a function of four demographic variables: rank, company command experience, staff experience, and years in the regular Army.

As shown in Table 8, rank does not have an apparent relation to staff roles knowledge [$t_{lieutenants,captains}(32) = .205, p = .839, d = .07$], but may be associated with wargaming tacit knowledge and team-related motivation. Lieutenants showed higher levels of wargaming tacit knowledge than captains. This difference was statistically non-significant [$t(24) = 1.186, p = .247$], however, the effect size of this difference approached moderate ($d = .46$). The size of this effect suggests that lieutenants, on average, should appear to an educated observer (i.e., without special-purpose assessment) to have a more nuanced understanding of wargaming than captains. Moreover, this effect size is especially large for a new area of research inquiry in a relatively uncontrolled experimental setting (see Cohen, 1988, pp. 25-27). Team-related motivation shows an increasing trend with rank, which may correspond to increased investment in the Army, but this trend should be interpreted with great caution as it is not statistically significant and only one major is included in the sample.

Table 8

Wargaming Determinants Scores and Officer Rank

	LT	CPT	MAJ
Staff Roles Knowledge	.07 (N=14)	.03 (N=20)	.01 (N=1)
Wargaming Tacit Knowledge	2.05 (N=11)	1.33 (N=15)	N/A
Team-Related Motivation	35.92 (N=12)	36.68 (N=19)	41 (N=1)

It may seem surprising that increases in rank are not associated with corresponding increases in staff roles knowledge, but it should be remembered that the students in the course were similarly inexperienced with regard to staff structure and function. In part, the purpose of the AC3DL is to address this knowledge gap. For this reason, it is unknown why lieutenants on average scored higher than captains on the Wargaming Tacit-Knowledge Assessment. Prior to enrolling in AC3DL, neither lieutenants nor captains would be expected to have a great deal of experience with wargaming, explicit or otherwise.

As shown in Table 9, company command experience does not appear to be associated with higher scores on the Team-Related Motivation Survey. Company command experience, however, appears associated with slightly higher scores on the Staff Roles Knowledge Assessment and the Wargaming Tacit Knowledge Assessment [$t(34) = -.868$ and $t(23) = -.370$, respectively]. The differences are not significant but the relatively small effect sizes ($d = .31$ and .15, respectively), may be expected for new areas of research inquiry in an uncontrolled research setting (Cohen, 1988). In addition, one would not expect great differences in levels of

knowledge because the students in the course were similarly inexperienced with regard to staff structure and function and wargaming.

Table 9

Wargaming Determinants and Company Command Experience

	Company Command (CO Cmd) Experience - Yes	CO Cmd Experience - No
Staff Roles Knowledge	.07 (N=14)	-.08 (N=22)
Wargaming Tacit Knowledge	1.73 (N=10)	1.52 (N=15)
Team-Related Motivation	36.58 (N=12)	36.53 (N=19)

The data in Table 10 suggest that staff experience is associated with increased staff roles knowledge and wargaming tacit knowledge, as would be expected. The difference in staff roles knowledge between students with and without staff experience is non-significant [$t(34) = -.993$, $p = .328$], but the effect size for this difference ($d = .34$) is noteworthy given the uncontrolled experimental conditions. The difference in wargaming tacit knowledge between students with and without staff experience is non-significant [$t(23) = -.410$, $p = .686$], but the effect size for this difference is also small ($d = .17$). Staff experience appears more strongly associated with higher levels of team-related motivation [$t(29) = -1.246$, $p = .223$, $d = .46$]. This effect size is substantial in light of the relatively uncontrolled experimental setting, suggesting that officers with staff experience should appear to the educated observer (i.e., without using a special-purpose assessment) to have higher levels team-related motivation.

Table 10

Wargaming Determinants and Staff Experience

	Staff Experience - Yes	Staff Experience - No
Staff Roles Knowledge	.04 (N=22)	-.12 (N=14)
Wargaming Tacit Knowledge	1.71 (N=14)	1.45 (N=11)
Team-Related Motivation	37.26 (N=19)	35.42 (N=12)

Table 11 shows that regular Army experience is not associated with greater levels of staff roles knowledge [$t(35) = -.205$, $p = .839$, $d = .07$]. However, regular Army experience does appear associated with wargaming tacit knowledge and team-related motivation. The difference in wargaming tacit knowledge between students with and without regular Army experience, however, is non-significant [$t(24) = -.123$, $p = .903$] and the effect size for this difference is quite small ($d = .05$). The difference in team-related motivation between students with and without regular Army experience is non-significant [$t(30) = -1.691$, $p = .100$], however the effect size is moderate-large ($d = .60$) especially given the uncontrolled nature of the experimental setting. It is unclear why regular Army experience would be so strongly related to team-related motivation, but perhaps the association reflects greater investment in the Army in general.

Table 11

Wargaming Determinants and Regular Army Experience

	Reg. Army Experience - Yes	Reg. Army Experience - No
Staff Roles Knowledge	.01 (N = 22)	-.02 (N = 15)
Wargaming Tacit Knowledge	1.67 (N = 15)	1.59 (N = 11)
Team-Related Motivation	37.50 (N = 18)	35.14 (N = 14)

In summary, as one might expect, rank and regular Army experience are not strongly associated with staff roles knowledge and wargaming tacit knowledge. However, where a trend (albeit non-significant) exists, it goes in the direction one might expect--greater experience in general is associated with higher knowledge scores--and the size of the effects found generally correspond to those that would be expected for new research in a relatively uncontrolled setting. One exception is the association between rank and scores on the Wargaming Tacit Knowledge Assessment, where for unknown reasons higher rank is associated with lower scores. Staff experience and company command experience show similar trends, with experience associated with higher scores on the knowledge assessments. These trends show stronger effect sizes than those generally associated with rank or regular Army experience, even though it is likely that students in AC3DL with staff experience have not had a great deal of formal training in staff function (Thompson, Thompson, Pleban & Valentine, 1991).

Staff experience and regular Army experience do appear associated with team-related motivation, however, there is no reason to expect that they should be. It is possible that greater investment in the Army (as reflected in having greater experience) engenders higher levels of motivation. The above findings suggest that the assessments of wargaming determinants developed in the present research are sensitive to experiential variables yet also reflect the lack of variability in staff and wargaming experience present among AC3DL students.

A final test of the assessments of wargaming determinants is their relation to one another. It is expected that scores on these assessments will show a weak relation to one another as they are posited to contribute uniquely to wargaming process and outcome effectiveness. The results of this test are shown in Table 12 below.

Table 12

Wargaming Determinants Relation to One Another

	1.	2.	3.
1. Staff Roles Knowledge	1.00 (N=37)		
2. Wargaming Tacit Knowledge	.07 (N=26)	1.00 (N=26)	
3. Team-Related Motivation	-.01 (N=32)	-.24 (N=23)	1.00 (N=32)

Somewhat surprisingly, the correlation matrix shown in Table 12 does not show positive manifold as is regularly demonstrated among ability test correlations. Instead, two of the three

correlation coefficients among the three assessments of wargaming determinants are negative, albeit weak and non-significant. It is unknown why these correlations are negative, but the correlations are weak, as expected, despite the satisfactory reliabilities of these assessments.

Wargaming Determinants – Relation to Wargaming Process Effectiveness

The wargaming framework posits two wargaming processes: team communication and adaptivity of team thought. It is expected that wargaming determinants will show a positive relation to these processes but that these processes will have a low to moderate correlation with one another. Both of the wargaming processes posited in the wargaming framework were assessed in the present research. However, they were not assessed at the same time, which means that they were also not assessed during wargaming that involved the same mission scenario. Moreover, only two groups of students were observed using both the Team Communication and TLAC Checklists. For these reasons, the relation between team communication and adaptivity of team thought was not explored in the present research. The relation between wargaming determinants and processes was explored and the findings of this exploration are shown in the following three tables.

Table 13 below shows the average Staff Roles Knowledge Assessment score for each group of students, the same score for each group's executive officer (XO), or team lead, and the corresponding wargaming process scores. Where a particular group was not observed using one of the checklists, "N/A" is indicated in the corresponding cell. Where a group was observed using both checklists (i.e., the group was observed in both the distributed/collaborative and resident phases of AC3DL, groups 2 and 4), there are two Staff Roles Knowledge Assessment scores representing differences in the group composition between the distributed/collaborative and resident phases of instruction. For ease of review, groups are listed in ascending order according to their Staff Roles Knowledge Assessment Score.

Table 13

Staff Roles Knowledge and Wargaming Process Effectiveness

Group	Individual Determinant		Process Effectiveness			
	Staff Roles Knowledge		Team Communication			TLAC Checklist
	Group Avg.	XO Score	Total	Task	Info Share	
1	-.24	-.04	.53	.67	.38	N/A
4a	-.17	-.63	.28	.46	.15	N/A
6	-.04	.32	.29	.41	.17	N/A
4b	.03[a]	-.63	N/A	N/A	N/A	1.71
3	.01	.01	N/A	N/A	N/A	1.56
2a	.10	.40	.42	.55	.29	N/A
5	.20	-.04	.28	.46	.09	N/A
2b	.24[b]	.40	N/A	N/A	N/A	1.17

[a]Four of 7 group members completed the Staff Roles Knowledge Assessment. This average should be interpreted with caution.

[b]Only 3 of 12 group members completed the Staff Roles Knowledge Assessment. Eight students did not complete the assessment as they were not present in a distributed/collaborative session that was observed during data collection. One student did not complete the assessment for unknown reasons. This average should not be considered representative of the group as a whole.

Average scores on the Staff Roles Knowledge Assessment do not appear clearly linked to wargaming process effectiveness scores. Where wargaming process effectiveness is assessed via the TLAC Checklist, there are too few groups assessed to begin looking for a pattern. Where wargaming process effectiveness is assessed via the Team Communication Checklist, a clear pattern linking Team Communication total scores and staff roles knowledge is not apparent. The same is true when the Staff Roles Knowledge Assessment score for each group's executive officer (i.e., team lead) is compared to Team Communication total scores. A pattern is more readily seen when each team leader's Staff Roles Knowledge Assessment score is compared to the Team Communication information sharing score. Here, higher levels of staff roles knowledge generally are associated with higher information sharing scores. When examining these patterns, however, it should be recalled that Group 1 was observed for Team Communication during co-located wargaming with a less central recording technique and better simulation of the operational environment (see pp. 23-24). In addition, the restriction in range in Staff Roles Knowledge Assessment scores may reduce the meaningfulness of the associations reviewed here. The sample size (i.e., number of groups) is too small to compute a reliable correlation.

Table 14 below shows the average Wargaming Tacit Knowledge (TK) Assessment score for each group of students, the same score for each group's XO, and the corresponding wargaming process scores. Where a particular group was not observed using one of the checklists, "N/A" is indicated in the corresponding cell. Where a group was observed using both checklists (i.e., the group was observed in both the distributed/collaborative and resident phases of AC3DL, groups 2 and 4), there are two Wargaming Tacit Knowledge Assessment scores representing differences in the group composition between the distributed/collaborative and resident phases of instruction. For ease of review, groups are listed in ascending order according to their Wargaming Tacit Knowledge Assessment Score.

Table 14

Wargaming Tacit Knowledge and Wargaming Process Effectiveness

Group	Individual Determinant		Process Effectiveness			
	Wargaming TK		Team Communication			TLAC Checklist
	Group Avg.	XO Score	Total	Task	Info Share	
4a	.33	1.00	.28	.46	.15	N/A
4b	1.19[a]	1.00	N/A	N/A	N/A	1.71
5	1.88	2.50	.28	.46	.09	N/A
6	1.25	.00	.29	.41	.17	1.71
1	2.00	.00	.53	.67	.38	N/A
2a	2.13	2.50	.42	.55	.29	N/A
2b	1.33[b]	2.50	N/A	N/A	N/A	1.17
3	N/A	N/A	N/A	N/A	N/A	1.56

[a]Four of 7 group members completed the Wargaming Tacit Knowledge Assessment. This average should be interpreted with caution.

[b]Only 3 of 12 group members completed the Wargaming Tacit Knowledge Assessment. Eight students did not complete the assessment as they were not present in a distributed/collaborative session that was observed during data collection. One student did not complete the assessment for unknown reasons. This average should not be considered representative of the group as a whole.

Table 14 shows a generally increasing trend in both average group wargaming tacit knowledge scores and Team Communication total scores. The average wargaming tacit knowledge score for student groups scoring lowest in team communication is 1.15, whereas it is 2.07 for groups scoring highest in team communication. There appears to be no association between the tacit-knowledge score of the student group team lead (XO) and wargaming process effectiveness as captured by either checklist. The sample size (i.e., number of groups) is too small to compute a reliable correlation.

Table 15 below shows the average Team-Related Motivation Survey score for each group of students and their corresponding wargaming process scores. As with the previous two tables, where a particular group was not observed using one of the checklists, "N/A" is indicated in the corresponding cell. Where a group was observed using both checklists (i.e., the group was observed in both the distributed/collaborative and resident phases of AC3DL), there are two Team-Related Motivation Survey scores representing differences in the group composition between the distributed/collaborative and resident phases of instruction. Also similar to the previous two tables, groups are listed in ascending order according to their Team-Related Motivation Survey score.

Table 15

Team-Related Motivation and Wargaming Process Effectiveness

Group	Individual Determinant	Process Effectiveness			
	Team-Related Motivation	Team Communication			TLAC Checklist
	Group Avg.	Total	Task	Info Share	
5	33.20	.28	.46	.09	N/A
3	35.33	N/A	N/A	N/A	1.56
6	36.33	.29	.41	.17	N/A
2a	37.25	.42	.55	.29	N/A
2b	40.00[a]	N/A	N/A	N/A	1.17
1	38.20	.53	.67	.38	N/A
4a	41.67	.28	.46	.15	N/A
4b	39.25[b]	N/A	N/A	N/A	1.71

[a]Only 1 of 12 group members completed the Team-Related Motivation Survey. Eight students did not complete the assessment as they were not present in a distributed/collaborative session that was observed during data collection. Three students did not complete the assessment for unknown reasons. This average should not be considered representative of the group as a whole.

[b]Four of 7 group members completed the Team-Related Motivation Survey. This average should be interpreted with caution.

It is difficult to discern a pattern in the results this table. The student groups with the highest and lowest motivation scores performed similarly with regard to team communication. One possible explanation for the lack of a clear pattern (aside from the small sample size) is range restriction in the motivation survey scores. Because the possible range in scores on the survey is 0-48, the observed range of 33.20-41.67 may not represent meaningful variation (i.e., a score of 33.20 represents an average endorsement of 2.67 using a scale of 0-4 and a score of 41.67 represents an average endorsement of 3.47).

In summary, the results are mixed regarding the relation between the wargaming determinants identified in the conceptual framework and wargaming process effectiveness. The staff roles knowledge score earned by the student group team lead (XO) and the average group wargaming tacit-knowledge score appear associated with the quality of team communication, although further exploration with a larger number of student groups is required to draw firm conclusions. Team-related motivation was consistently high across groups, and thus did not appear associated with the quality of team communication. Unfortunately, there were too few administrations of the TLAC Checklist (given its requirement for student expertise and dedicated class time) to reliably evaluate the relation between wargaming determinants and adaptivity of team thought.

When reviewing the above tables, one should bear in mind several possible explanations for why a clearer pattern of results was not observed. The first reason is that the number of groups observed was relatively small. Although all of the AC3DL student groups that could have been observed were observed, six is too small a number to reliably identify a pattern in the data. Moreover, no more than five groups was observed with any one checklist. Second, 5 of the 6 groups was comprised of six or fewer students, making average scores unstable. Third, there were differences in the conditions under which team communication was observed. These differences include the wargaming environment (co-located or distributed), the number of students wargaming, the extent of technical problems experienced during the war game, etc. These situational differences compete with individual/group differences in determining the effectiveness of wargaming processes.

Wargaming Determinants and Process Effectiveness – Relation to Wargaming Outcome Effectiveness

The wargaming framework posits two wargaming outcomes: shared battlefield visualization and an integrated mission plan. It is expected that wargaming processes will show a positive relation to these outcomes but that these outcomes will be moderately associated with one another. Only one of the wargaming outcomes posited in the wargaming framework was assessed in the present research. Therefore, the relation between shared battlefield visualization and the level of integration in the mission plan could not be explored. The relation between wargaming determinants, processes, and outcomes was explored and the findings of this exploration are shown in the following three tables. In addition, instructor ratings were used as outcome assessments to explore external validity.

Table 16 below shows the wargaming process scores for each group of students and their corresponding wargaming outcome score and instructor ratings. Where a particular group was not observed or did not complete the SA Exercise, "N/A" is indicated in the corresponding cell. The ratings in the instructor rating columns should be interpreted as "distributed wargaming/co-located wargaming." Where wargaming was observed in only one environment, that environment is listed in parentheses next to the instructor rating, with "(d)" indicating distributed and "(c)" indicating co-located. For ease of review, groups are listed in ascending order according to their Team Communication score.

Table 16

Wargaming Processes and Wargaming Outcomes

Group	Wargaming Process Effectiveness				Wargaming Outcome Effectiveness			
	Team Communication			TLAC Checklist	SA Exercise		Instructor Rating - Doctrine	Instructor Rating - Others
	Total	Task	Info Share		Average Individual	Team Score		
5	.28	.46	.09	N/A	3.26	3.33	Poor (d)	Below Avg. (d)
6	.29	.41	.17	N/A	4.00	1.50	Fair (d)	Avg. (d)
4	.28	.46	.15	1.71	2.00	.67	Fair/Good	Avg./Above Avg.
2	.42	.55	.29	1.17	N/A	N/A	Good/Excellent	Avg./Above Avg.
1	.53	.67	.38	N/A	N/A	N/A	Good (c)[a]	Average (c)
3	N/A	N/A	N/A	1.56	N/A	N/A	Good (c)	Above Avg. (c)

[a]This group was also observed during distributed wargaming, but no wargaming process observations were conducted at that time, so the ratings are left out to aid in interpretation.

Table 16 generally shows that as Team Communication scores increase, instructor ratings also increase. On average, student groups rated "fair" or "poor" earned Team Communication scores of .28 (Total), .44 (Task), and .14 (Info Share), whereas student groups rated "good" or "good/excellent" earned average Team Communication scores of .48 (Total), .61 (Task), and .34 (Info Share). Unfortunately, there are too few data points for the SA Exercise to reliably evaluate the relation between this wargaming outcome and wargaming processes.

Table 17 below shows the average individual and team-related wargaming determinants scores for each group of students and their corresponding wargaming outcome score and instructor ratings. Where a particular group did not complete an assessment, "N/A" is indicated in the corresponding cell. Where wargaming was observed in only one environment, that environment is listed in parentheses next to the instructor rating, with "(d)" indicating distributed and "(c)" indicating co-located. For groups who wargamed in both distributed and co-located environments (Groups 1, 2, and 4), there are two sets of wargaming determinant scores representing differences in the group composition between the distributed/collaborative and resident phases of instruction[2]. For ease of review, student groups are listed in ascending order according to their instructor ratings.

Table 17 generally shows that as instructor ratings increase, scores on the wargaming determinants assessments roughly increase as well. For student groups rated "fair" or "poor" by instructors, the average Staff Roles Knowledge Assessment score was .00, whereas for student groups rated "good" of "excellent" by instructors, this was, on average, .03. The average Staff Roles Knowledge Assessment score of the team leads (XOs) for groups rated "fair" or "poor" was -.34 in contrast to .03 for groups rated "good" or "excellent." Similarly, the average wargaming tacit knowledge score for lower-rated ("poor" or "fair") student groups was 1.15, whereas the score earned by the higher-rated ("good" or "excellent") groups was 1.66. Once

[2] Recall, however, that Group 1 did not receive wargaming determinant assessments before distributed wargaming. Therefore, no scores are available and N/A is shown in the table.

again, team-related motivation does not bear a clear relationship to instructor ratings of wargaming effectiveness (37.07 for lower-rated groups vs. 38.01 for higher-rated groups). All of these differences obviously should be interpreted with caution, however, given the limited number of groups. Unfortunately, there are too few data points for the SA Exercise to reliably evaluate the relation between this wargaming outcome and wargaming determinants.

In summary, it appears the assessments of wargaming determinants and processes may be related to wargaming effectiveness as rated by instructors. This result supports hopeful conclusions about the validity of the wargaming assessments, of the wargaming conceptual framework, and of the very endeavor to assess wargaming performance. Although the findings presented in this section must be greeted with the caution appropriate when very small sample sizes and an uncontrolled assessment situation are involved, the several lines of converging evidence just described suggest that similar results might be found with larger sample sizes. This, of course, remains to be tested.

Table 17

Wargaming Determinants and Wargaming Outcomes

Group	Wargaming Determinant Scores					Wargaming Outcome Effectiveness			
	Staff Roles Knowledge		Wargaming TK		Team-Related Motivation	SA Exercise		Instructor Rating - Doctrine	Instructor Rating - Others
	Group Avg.	XO	Group Avg.	XO		Avg Individual	Team Score		
5	.47	.21	1.88	2.50	33.20	3.26	3.33	Poor (d)	Below Avg. (d)
1a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Poor	Average
1b	.39	.36	2.00	.00	38.20	N/A	N/A	Good	Average
6	.41	.48	1.25	.00	36.33	4.00	1.50	Fair (d)	Average (d)
4a	.42	.30	.33	1.00	41.67	2.00	.67	Fair	Average
4b	.43	.30	1.19	1.00	39.25	N/A	N/A	Good[a]	Above Avg.
3	.42	.39	N/A	N/A	35.33	N/A	N/A	Good (c)	Above Average (c)
2a	.45	.52	2.13	2.50	37.25	N/A	N/A	Good	Average
2b	.46	.52	1.33	2.50	40.00	N/A	N/A	Excellent[b]	Above Avg.

[a]Wargaming determinant scores do not correspond exactly to observations during co-located wargaming. Three participants in the co-located wargaming did not complete the wargaming determinants assessments.
[b]Eight participants in the co-located wargaming did not complete the wargaming determinants assessments.

Discussion

The present research provides a more in-depth understanding of wargaming and its effectiveness assessment than previously has been accomplished. Several psychological constructs comprising wargaming determinants, processes, and outcomes have been identified. In addition, the feasibility and (where applicable) the psychometric soundness of assessments of several of these constructs when administered to groups of wargamers in an uncontrolled environment have been demonstrated. This work therefore sets the stage for more systematic assessment of wargaming effectiveness and diagnosis of shortfalls in wargaming performance. Understanding the true implications of the present research and designing its thoughtful extension, however, requires consideration of its strengths and limitations, summarized below.

Strengths

The fundamental strength of the present research is its contribution to understanding and assessing wargaming effectiveness. The framework for conceptualizing wargaming is based on the application of psychological theory to understanding operational behavior, thus making the framework relatively general across wargaming situations, acceptable to SMEs, and understandable to psychologists tasked with assessment development. In addition, the assessments developed are flexible. They are portable across wargaming environments, including co-located and distributed, traditional and digitally supported wargaming environments. They also can be implemented in either paper-and-pencil format or in computerized format with automatic data recording and tabulation.

Importantly, the assessments also are portable across wargaming situations involving different mission scenarios. The assessments of wargaming determinants (individual and team-related)--the MABE, the Staff Roles Knowledge Assessment, the Wargaming Tacit Knowledge Assessment, and the Team-Related Motivation Survey--may be reused without modification regardless of mission scenario. The wargaming process and outcomes assessments--the Team Communication Checklists, the TLAC Checklists, the SA Exercise, and the Integrated Overlay Exercise--are partially portable across wargaming situations. Because these assessments are scenario-specific, their portability is constrained by the degree of similarity among the mission scenarios used in each wargaming situation. However, because a well-documented and principled approach was used to design the assessments, the modification of scenario-specific assessments is a straightforward, if effortful endeavor. Appendix J provides detailed design guidelines for modifying the scenario-specific assessments developed in the present research.

Limitations

Although the present research provides a framework for conceptualizing wargaming determinants (individual and team-related), process, and outcomes, this framework has not been formally validated through large-scale correlational study and external validation. Such a formal validation effort was beyond the scope and resources of the present research project, but nevertheless such a validation should be conducted before the framework is considered "official." The primary threat to the validity of the framework is the lack of representativeness of the wargaming environment studied. That is, the research was conducted using officers who were simulating staff operations as part of a learning exercise. These officers were not staff officers and had very little experience with combined arms military planning. More importantly, the wargaming observed as part of the present research had been stripped of much of its operational context in order to generate a feasible learning exercise. Missing context, such as (among others) vertical coordination with brigade staff elements, use of operational command and control technology, and the presence of a commander, may have resulted in an overly simplified framework. The framework was designed with the intent that it be robust across the range of wargaming situations (e.g., experienced vs. inexperienced staffs, conventional vs. unconventional mission planning, etc.), but the actual stability of the framework remains to be tested.

A second limitation of the present research concerns the validation of the assessments that were developed and administered. Here too, a formal validation effort was beyond the scope and resources of the present research project. The assessments could be administered neither to a large number of student groups, nor to research participants with a range of experience with wargaming and military planning. Although the initial results are promising, a more controlled validation study is required to formally validate the assessments.

Conclusions and Future Directions

In the present research, the wargaming process was explored to gain a more in-depth understanding than has previously been accomplished, an understanding necessary to design reliable and valid wargaming performance assessments. This exploration supported the main research objective of identifying, developing, and validating techniques for assessing the determinants (individual and team-related), processes, and outcomes of effective wargaming.

An important lesson learned from the present research is that wargaming assessment validation efforts must involve an integrated approach in which assessment design is based on a thorough understanding of the activity to be assessed, assessment implementation is based on a thorough understanding of the environment in which assessment will occur, and assessment validation is accomplished in a controlled setting in which specific hypotheses about the assessments can be tested. The integrated approach enables researchers to empirically validate performance assessments while at the same time evaluating the feasibility of the assessments and ensuring their relevance in the actual performance environment.

The conditions under which the present research was conducted did not permit work with a large number of research participants in a controlled setting, as is recommended for assessment-validation studies. Moreover, because the research involved a small number of student groups from just one course (AC3DL), the ability to field-test certain hypotheses about the validity of the assessments was significantly limited. However, it was possible to determine what the nature of assessments for capturing wargaming performance should be (i.e., what competencies and behaviors should be assessed) and to evaluate the feasibility of implementing these assessments in multiple performance environments.

Important technical factors to consider when implementing performance assessments in collaborative virtual environments include the speed of the Internet connection used by the examinees, the operating system and service packs in use on their personal computers, and the stability of the virtual environment. The reality of advanced collaboration platforms is that they are not similarly experienced by all collaborators and that difficulty with various elements of the technology--due to unforeseen and non-replicable conditions--is commonplace. These factors influence the feasibility of all types of assessments, including observer checklists and automated data collection. To ensure that assessments capture what they are intended to capture, designers and developers must make certain that the assessments will be accessible to the range of computer configurations available to examinees and robust in the face of technical difficulty.

Important behavioral factors to consider when implementing performance assessments in collaborative virtual environments include the time required to administer/score the assessments,

the usability of the assessments, the level of experience of the individuals taking the assessments, and the level of buy-in with which both examinees and other interested parties approach the assessment methods and results. These factors influence whether the assessments are actually administered and/or whether the results of the assessments will be valued. To ensure that assessments will be used, designers and developers must work closely with stakeholders to make certain the assessments (a) capture constructs or behaviors of interest; (b) feature an appropriate level of difficulty, given examinee experience levels; (c) require minimal learning to administer/take; and (d) produce scores and feedback that are meaningful to those involved.

Future research exploring the assessment of collective staff activity during military planning should therefore focus on methods of integrating task and performance-environment analysis with controlled validation study. Controlled study would allow the identification of best practice in assessment design and implementation applied broadly across environments in which planning is conducted (e.g., different types of units, differing amounts of staff turnover or staff expertise, differing levels of digitization). Task analysis should guide the design and development of the assessments to be validated, and performance-environment analysis should illuminate the boundary conditions that constrain the generalizability of the validation results.

Where wargaming is to remain the subject of future research, study exploring the implications of transformation for the integration and synchronization of the battlefield operating systems is most needed. That is, the transformation of brigades and battalions to modular units has implications for the composition of the brigade and battalion battle staffs, the roles of their members, and the nature of mission plans. One example of significant change in staff composition and roles is the advent of the fires and effects coordination cell (FECC) now present in the brigade staff and closely linked to the field artillery battalion staff (*FMI 3-09.42*; DA, 2005). The FECC differs from the traditional brigade fire support element in that it features an information operations component which aids in fires and effects targeting (Glenister, 2002). Yet, as the absence of specific doctrine reflects, the tactics for arranging assets in time and space to conduct effects-based operations against the asymmetric enemy are largely unknown, and the optimal staff composition for accomplishing effects-based mission planning is yet unachieved. Moreover, the nature of effects-based operations, which the FECC is designed to support, is not well understood by staff officers or their commanders.

The approach developed in the present research, the conceptual framework for wargaming, and the guidelines for assessment development serve as a springboard for future assessment research in both field and controlled settings, and in some combination of the two. If extended and applied, this work could escort operations command and control teams into the future through a better understanding of how to develop and support their collective mission planning competence.

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Appendix A

List of Acronyms

ABF	Assault by Fire
AC3	Armor Captain's Career Course
AC3DL	Armor Captain's Career Course – Distance Learning
ACES	Armored Combat Earthmovers
ADA	Air Defense Artillery
ADO	Air Defense Officer
ALO	Air Liaison Officer
AO	Area of Operations
ARC	Action-Reaction-Counteraction
ASR	Alternate Supply Route
AT	Anti-Tank
ATK	Attack
AXP	Ambulance Exchange Point
BDE	Brigade
BHL	Battle Handoff Line
BN	Battalion
BOS	Battlefield Operating Systems
BPT	Be Prepared To
C2	Command and Control
C4	Command Control Communications and Computers
CABTF	Combined Arms Battalion Task Force
CALL	Center for Army Lessons Learned
CAS	Close Air Support
CASEVAC	Casualty Evacuation
CAT	Civil Affairs Team
CATK	Counterattack
CCIR	Commander's Critical Information Requirements
CDR	Commander
CFL	Coordinated Fire Line
CGSC	Command and General Staff College
CHEMO	Chemical Officer
CL	Class
CL I	Class I: Subsistence Items
CL II	Class II: Individual Equipment, Clothing, Tool Sets, House Keeping Supplies
CL III	Class III: Petroleum, Oils, Lubricants
CL III (B)	Class III (b): Bulk Petroleum
CL IV	Class IV: Construction and Barrier Material
CL V	Class V: Ammunition
CL VII	Class VII: Major End Items

CL VIII	Class VIII: Medical Material
CL IX	Class IX: Repair Parts and Components
CO CMD	Company Command
COA	Course of Action
COLT	Combat Observation Lasing Team
CP	Command Post
CPT	Captain
CS	Combat Support
CSOP	Combat Security Outpost
CSS	Combat Service Support
CTCP	Combat Trains Command Post
DA	Department of the Army
DP	Decision Point
DSM	Decision Support Matrix
DST	Decision Support Template
EEFI	Essential Elements of Friendly Information
ELINT	Electronics Intelligence
ENG	Engineer
EW	Electronic Warfare
FA	Field Artillery
FARP	Forward Arming and Refueling Point
FASCAM	Family of Scatterable Mines
FECC	Fires and Effects Coordination Cell
FFIR	Friendly Forces Information Requirements
FFTLOK	Fighters for the Liberation of Kentuckia
FIST	Fire Integration Support Team
FLOT	Forward Line of Own Troops
FM	Field Manual
FMI	Field Manual - Interim
FSC	Forward Support Company
FSO	Fire Support Officer
HE	High Explosive
HHC	Headquarters and Headquarters Company
HPT	High Payoff Target
HPTL	High Payoff Target List
HUMINT	Human Intelligence
HVT	High Value Target
IB	International Border
IED	Improvised Explosive Device
IFV	Infantry Fighting Vehicle
IMINT	Imagery Intelligence

IN	Infantry
IO	Information Operations
IPB	Intelligence Preparation of the Battlefield
ISR	Intelligence, Surveillance, and Reconnaissance
JSOTF	Joint Special Operations Task Force
LD	Line of Departure
LOC	Lines of Communication
LOG PAC	Logistics Package
LRP	Logistics Release Point
LT	Lieutenant
MABE	Mission Analysis Briefing Exercise
MAJ	Major
MDMP	Military Decision-Making Process
MEDEVAC	Medical Evacuation
MCOO	Modified Combined Obstacle Overlay
METT-TC	Mission, Enemy, Troops, Terrain and Weather, Timing, and Civil Factors
MI	Military Intelligence
MIC	Mechanized Infantry Company
MICLIC	Mine Clearing Line Charge
MOPP	Mission Oriented Protective Posture
MSR X	Main Supply Route X
MTOE	Modified Tables of Organization and Equipment
N/A	Not Applicable
NAI	Named Area of Interest
NBC	Nuclear, Biological, Chemical
NW	North West
OBJ	Objective
OP	Observation Post
OPORD	Operations Order
OPSEC	Operations Security
PAA	Position Area for Artillery
PIR	Priority (or Primary) Intelligence Requirement
PL	Phase Line
PLT	Platoon
POL	Petroleum, Oils, and Lubricants
PSYOP	Psychological Operations
R3	Re-arm, Re-fuel, Re-supply
R3P	Re-arm, Re-fuel, Re-supply Point

REMBASS	Remotely Monitored Battlefield Sensor System
RETRANS	Retransmission
ROE	Rules of Engagement
ROM	Refuel on the Move
ROWPU	Reserve Osmosis Water Purification Unit
RSTA	Reconnaissance, Surveillance, and Target Acquisition
S1	Adjutant/Personnel Officer
S2	Intelligence Officer
S3	Operations and Training Officer
S4	Supply/Logistics Officer
SA	Situation Awareness
SBCT	Stryker Brigade Combat Team
SBF	Support by Fire
SEE	Small Emplacement Excavator
IGINT	Signals Intelligence
SIGO	Signal Officer
SITTEMP	Situation Template
SME	Subject Matter Expert
SOP	Standing Operating Procedure
SOSO	Stability Operations and Support Operations
SOSR	Suppress, Obscure, Secure, Reduce
SP	Start Point
SPF	Special Purpose Forces
SPOTREP	Spot Report
TAC-P	Tactical Air Control Party
TAI	Targeted Area of Interest
TARGETS	Targeted Acceptable Responses to Generated Events or Tasks
TF	Task Force
TK	Tacit Knowledge
TLAC	Think Like a Commander
TM	Training Manual
TOC	Tactical Operations Center
TPT	Tactical PSYOP Team
TRP	Target Reference Point
TTP	Tactics, Techniques, and Procedures
UAV	Unmanned Aerial Vehicle
UMCP	Unit Maintenance Collection Point
VTOC	Virtual Tactical Operations Center
XO	Executive Officer

Appendix B

Staff Roles Knowledge Assessment

BOS #1 – COMMAND AND CONTROL

1. Clearly identify the commander's intent and vision of the battle.

Task Definition: Clear identification of the commander's intent and vision of the battle requires an in-depth familiarity with the purpose, key tasks, and end state of the mission, as well as the commander's priorities for all combat, combat support (CS), and combat service support (CSS) elements and how he envisions their support of his concept.

Staff Officers Involved: Executive Officer (XO), Adjutant/Personnel Officer (S1), Intelligence Officer (S2), Operations and Training Officer (S3), Supply/Logistics Officer (S4), Signal Officer (SIGO), Fire Support Officer (FSO), Air Defense Officer (ADO), Engineer (ENG)

Rationale: The effectiveness and timeliness of the war game depends on clear identification of the commander's intent and vision of the battle. This is because the commander and his staff use wargaming to, among other things, (a) determine how to maximize combat power against the enemy while protecting the friendly forces and minimizing collateral damage; (b) have as near an identical vision of the battle as possible; and (c) determine the conditions and resources required for success. Because all staff officers must participate actively for wargaming to be effective, all staff officers must be able to clearly identify the commander's intent and vision of the battle. The commander also plays a key role in this task by communicating his intent and vision effectively.

References: FM 5-0 (pp. 3-5, 3-33 to 3-34)

2. Determine the command and control requirements for minimizing the effect of destruction of friendly Command Posts (CPs).

Task Definition: Determination of the command and control (C2) requirements for minimizing the effect of destruction of friendly CPs requires identification of (a) succession of command; (b) provisions for redundancy in communications by having backup at key locations; (c) SOPs for subordinates to follow during interruptions in communications; and (d) alternative means of communication if main means are eliminated.

Staff Officers Involved: XO, S3, SIGO

Rationale: The XO is the task force's "chief of staff" and second in command, and must be prepared to assume the duties of commander at any time. He is responsible for directly supervising the main CP and headquarters cell, including displacement, protection, security, and communications. The S3 makes recommendations for C2 requirements based on his knowledge of the flow of battle, how the CPs will move with the battle, and how the fight will be controlled. The SIGO advises on all communications and electronics matters including the positioning of C2 elements. He is the point of contact for the issue of signal operating instruction during

operations, as well as for communications troubleshooting. He is also responsible for providing retransmission capabilities to the task force. He ensures that communication resources and support are adequate to meet mission requirements.

References: Commander's Battle Staff Handbook (p. 10, 56, 119 to 120); FM 3-90.2 (pp. 11-7 to 1-8); FM 101-5 (p. 4-2)

3. Determine or refine the Commander's Critical Information Requirements (CCIR).

Task Definition: The CCIR identify information needed by the commander to support his battlefield visualization and to make critical decisions during execution. This information represents what a commander needs to know in a specific situation to make a particular decision in a timely manner. Therefore, determining the CCIR involves identifying requirements for information and recognizing the importance of these requirements to the commander's decision-making process (e.g., their importance to confirming or denying a particular enemy COA). Refinement of the CCIR requires the identification of changes in (or updates to) the situation, environment, or timeframe and their corresponding implications for what the commander needs to know.

Staff Officers Involved: XO, S1, S2, S3, S4, SIGO, FSO, ADO, ENG

Rationale: The XO is responsible for managing the commander's CCIR. The S2 is responsible for coordinating with the entire staff and recommending PIR for the commander's CCIR. Each staff officer provides technical assistance to the S2 in their areas of interest, while studying and evaluating the enemy capabilities in their areas of interest and supporting the battlefield surveillance plan. If assigned to the battalion/task force, the chemical officer (CHEMO) is an important contributor to CCIR recommendations. *Note that staff officers nominate information requirements to become CCIR, but the commander alone decides what information is critical.*

References: FM 5-0 (pp. 3-18 to 3-19); FM 101-5 (pp. 4-2, 4-5, 4-10 to 4-17, 4-22 to 4-26)

4. Determine critical events and decision points.

Task Definition: Critical events are those events that directly influence mission accomplishment, including events that trigger significant actions or decisions, complicated actions requiring detailed study, and essential tasks identified during mission analysis. Determination of critical events therefore involves selecting from multiple events those events whose successful outcomes are required for mission accomplishment. Decision points are events or locations on the battlefield where tactical decisions are required during mission execution. They indicate when and where a decision must be made to have maximum impact on friendly or enemy COAs. Determination of decision points therefore requires selecting from multiple events or locations those events or locations where a decision is critical to tactical success.

Staff Officers Involved: XO, S1, S2, S3, S4, SIGO, FSO, ADO, ENG

Rationale: Determination of critical events and decision points is addressed in the task force scheme of maneuver, which is developed by the S3 in collaboration with the S1, S2, S4, SIGO, FSO, ADO, and ENG such that the scheme of maneuver is integrated with enemy, CS, and CSS capabilities and limitations. The XO is ultimately responsible for integrating and synchronizing the warfighting plans.

References: Commander's Battle Staff Handbook (p. 56); FM 5-0 (pp. 3-37 to 3-38); FM 101-5 (p. 4-2)

5. Determine command post locations and composition to support current and planned tactical operations.

Task Definition: There are three CPs involved in task force command and control: the main CP, the combat trains CP (CTCP), and the forward support company CP (FSC CP). Determination of the CP locations requires consideration of CP survivability, communications, and accessibility. Determination of CP composition requires consideration of how to balance the need for rapid displacement with C2 effectiveness, and the need for 24-hour security and operations.

Staff Officers Involved: XO, S1, S2, S3, S4, SIGO, ENG

Rationale: Key considerations for positioning the CPs include space available, terrain, weather, and other environmental factors, enemy factors, and operational factors, requiring input from the S2, S3, SIGO, and ENG. The S3, in coordination with the SIGO, recommends general locations of CPs. He ensures that the CPs will not be in the way of friendly operations, deconflicting the terrain based on his knowledge of the flow of battle and other factors. The SIGO ensures that selected areas afford the most in communications potential and the least in potential enemy electronic warfare (EW) interference. The S2, based on his knowledge of the enemy, assists in identifying security considerations. The TF XO is responsible for supervising all staff activities and functions within the main CP and headquarters cell, including displacement, protection, security, and communications, and so is positioned to make recommendations about main CP composition. Depending on the type of organization, the S4 or headquarters and headquarters company (HHC) commander (CDR) (or FSC CDR) is responsible for operations, movement, and security of the combat trains command post (CTCP). The S1 and S4 work closely in the CTCP, and so are positioned to make recommendations about CTCP composition.

References: Commander's Battle Staff Handbook (pp. 56, 119, 121); FM 3-90.2 (pp. 3-8 to 3-9, 11-2, 11-4); FM 101-5 (p. 4-13)

6. Assess the potential effect of battle intensity on Soldier and leader will to fight.

Task Definition: Assessment of the potential effect of battle intensity on Soldier and leader will to fight requires determination of battle intensity via casualty estimates and via estimation of personnel service support losses (e.g., postal services), both of which affect unit morale, and recognizing their implications for morale.

Staff Officers Involved: XO, S1

Rationale: The S1 is responsible for reporting the status of morale and esprit de corps, and any significant influences on the morale of units. The XO is responsible for monitoring the discipline, morale, and combat and mobilization readiness of the staff, which is also affected by battle intensity, and therefore can inform efforts to assess the potential effect of battle intensity on Soldier and leader will to fight. If assigned, the chaplain, surgeon, and command sergeant major are key assets of the battalion/task force S1 section who aid in this assessment.

References: Commander's Battle Staff Handbook (p. 29 to 36); FM 101-5 (p. 4-2, 4-10, 4-21, 4-30)

BOS #2 – INTELLIGENCE
7. Determine High Payoff Targets (HPTs).

Task Definition: High-payoff targets are those targets whose loss to the enemy will contribute to the success of the friendly COA. Determining HPTs requires joint consideration of the enemy commander's needs (high value targets [HVTs] – to include enemy combat, CS, and CSS elements) and the friendly concept of the operation.

Staff Officers Involved: XO, S2, S3, S4, FSO, ADO, ENG

Rationale: The S2, S3, and FSO form the core of the targeting team. The S2 develops the ISR plan/overlay to find high-payoff targets and participates in the targeting cell to help develop the HPT list. The S3 (or lethal effects cell, depending on the organization) plays a key role in selecting HPTs, collaborating with the FSO to integrate the tactical scheme of maneuver with fires. Normally, the XO oversees the routine activity and coordination of the targeting process. As required, other representatives within the tactical operations center may also be members of the targeting team, including the S4, ENG, and ADO. If assigned, the CHEMO also participates in the targeting cell. At the brigade level and above, the air liaison officer (ALO) participates in the targeting cell.

References: Commander's Battle Staff Handbook (p. 56, 83 to 90); FM 6-20-10 (Chs. 1 and 2); FM 101-5 (p. 4-22 to 4-24)

8. Determine optimal times and locations to maximize enemy casualties and force destruction.

Task Definition: Determining optimal times and locations to maximize enemy casualties and force destruction requires that information regarding (a) anticipated enemy locations, strengths, and actions; and (b) potential enemy mission, intent, objectives, defensive locations, use of key terrain, avenues of approach and routes, engagement areas, and obstacles be incorporated with the friendly commander's intent, mission, and integrated scheme of maneuver.

Staff Officers Involved: XO, S2, S3, S4, FSO, ADO, ENG

Rationale: Incorporating threat analysis with the scheme of maneuver requires coordination and information sharing between the S2, S4, ENG, and S3. For maximum planning effectiveness, the scheme of maneuver must be resourced and integrated with fire support, obstacles, and air defense. The XO is ultimately responsible for integrating and synchronizing the warfighting plans. If assigned, the CHEMO is also an important contributor because he plans and recommends integration of smoke and obscurants into tactical operations.

References: FM 3-90.2 (p. 5-26 to 5-29); FM 101-5 (p. 4-2, 4-6, 4-10 to 4-15, 4-23 to 4-25)

9. Determine ways and means to separate attacking enemy echelons.

Task Definition: Determining the ways and means to separate attacking enemy echelons requires that information regarding (a) anticipated enemy COAs; and (b) potential enemy mission, intent, objectives, use of key terrain, avenues of approach and routes, and engagement areas be incorporated with the friendly commander's intent, mission, and integrated scheme of maneuver.

Staff Officers Involved: XO, S2, S3, S4, FSO, ADO, ENG

Rationale: Incorporating threat analysis with the scheme of maneuver requires coordination and information sharing between the S2, S4, ENG, and S3. For maximum planning effectiveness, the scheme of maneuver must be resourced and integrated with fire support, obstacles, and air defense. The XO is ultimately responsible for integrating and synchronizing the warfighting plans. If assigned, the CHEMO is also an important contributor because he plans and recommends the use of flame-field expedients to supplement unit defense and existing minefields and barriers.

References: FM 3-90.2 (p. 5-26 to 5-29); FM 101-5 (p. 4-2, 4-6, 4-10 to 4-15, 4-23 to 4-25)

10. Determine ways and means to force enemy elements into areas where the commander wants them.

Task Definition: Determining ways and means to force enemy elements into areas where the commander wants them requires that information regarding (a) anticipated enemy locations, strengths, and actions; and (b) potential enemy mission, intent, objectives, defensive locations, use of key terrain, avenues of approach and routes, engagement areas, and obstacles be incorporated with the friendly commander's intent, mission, and integrated scheme of maneuver.

Staff Officers Involved: XO, S2, S3, S4, FSO, ADO, ENG

Rationale: Incorporating threat analysis with the scheme of maneuver primarily involves coordination and information sharing between the S2, ENG, and S3. For maximum planning effectiveness, the scheme of maneuver must be resourced and integrated with fire support, obstacles, and air defense. The XO is ultimately responsible for integrating and synchronizing the warfighting plans. If assigned, the CHEMO is also an important contributor because he plans and recommends integration of smoke and obscurants into tactical operations.

References: FM 3-90.2 (p. 5-26 to 5-29); FM 101-5 (p. 4-2, 4-6, 4-10 to 4-15, 4-23 to 4-25)

11. Identify expected enemy air or helicopter threats.

Task Definition: The probability of a task force asset being targeted for enemy air must be assessed if economical allocation of ADA resources is to be achieved. Identification of assets requiring active air defense protection involves consideration of targeting information provided by intelligence estimates, past enemy attack methods, and enemy doctrine.

Staff Officers Involved: S2, ADO

Rationale: The ADO should work closely with the S2 during the intelligence preparation on the battlefield (IPB) process and is best suited to prepare and brief the Air IPB. This continued coordination occurs during wargaming. At the brigade level and above, the ALO also assists in this task by supplying his experience and his knowledge of high-performance aircraft.

References: Commander's Battle Staff Handbook (p. 109, 112); FM 3-90.2 (p. 9-50); FM 101-5 (p. 4-22, 4-23)

12. Determine optimal employment of intelligence collection assets.

Task Definition: The intelligence collection management process involves, in part, defining what information is required, determining the best method to collect information, and allocating assets to gather information. Determining the optimal employment of intelligence collection assets therefore requires an understanding of what information should be collected and how this information should be collected. From this understanding, information requirements can be prioritized and intelligence assets can be assigned accordingly.

Staff Officers Involved: XO, S2, S3, S4, SIGO, FSO, ADO, ENG

Rationale: Development of the intelligence, surveillance, and reconnaissance (ISR) plan is a collaborative effort between the S3 and S2, supported by the remainder of the staff. Tasking of specific collection assets is determined based on the following factors: (a) availability; (b) capability; (c) vulnerability; and (d) performance history, which requires consideration of personnel and equipment status, signal capability, threat capability, and environmental conditions. Moreover, intelligence resources include scouts, maneuver companies, patrols, observation post (OPs), fire integration support team (FISTs), field artillery (FA), military intelligence (MI), army aviation, close air support (CAS), air defense artillery, combat engineers, and various CSS units. For these reasons, staff officers involved in the ISR plan may include (in addition to the S2) the S3, S4, SIGO, FSO, ADO, and ENG. The TF XO supervises overall development and synchronization of the ISR plan.

References: Commander's Battle Staff Handbook (pp. 42 to 45); FM 3-90.2 (pp. 4-2 to 4-7, 4-25)

BOS #3 – MANEUVER

13. Define branches and sequels to the maneuver scheme.

Task Definition: A branch is a contingency plan or course of action (an option built into the basic plan or course of action) for changing the mission, disposition, orientation, or direction of movement of the force to aid success of the current operation, based on anticipated events, opportunities, or disruptions caused by enemy actions. Sequels are operations that follow the current operation. They are future operations that anticipate the possible outcomes—success, failure, or stalemate of the current operation. Defining branches and sequels to the maneuver scheme involves identifying the need to change the decisive plan and execution criteria and developing an integrated plan for implementing the change.

Staff Officers Involved: XO, S2, S3, S4, SIGO, FSO, ADO, ENG

Rationale: For maximum planning effectiveness, the scheme of maneuver must be resourced and integrated with fire support, obstacles, and air defense. The XO is ultimately responsible for integrating and synchronizing the warfighting plans. If assigned, the CHEMO is also an important contributor because he plans and recommends integration of smoke and obscurants into tactical operations. At the brigade level and above, the ALO also participates in defining branches and sequels, coordinating tactical air support missions with fire support and the appropriate airspace command and control element.

References: FM 3-0 (pp. 4-25; 6-5); FM 3-90.2 (p. 5-26 to 5-29); FM 101-5 (p. 4-2, 4-6, 4-10 to 4-15, 4-22 to 4-25)

14. Identify triggers for the initiation of direct and indirect fires.

Task Definition: Triggers are a physical point on the ground or an action or an event. During offensive operations, a trigger is often a maneuver action or event. In the defense, a trigger is more often a physical spot on the ground. Trigger development requires (a) determining the position on the ground where you want to impact on the enemy or to silhouette the enemy; (b) determine the enemy rate of movement; (c) determine the time of flight of the rounds from the weapon system firing the mission; (d) determine the processing time; (e) determine the total mission time; and (f) place the trigger point the required distance from a planned target location based on total mission time x speed of enemy.

Staff Officers Involved: S2, S3, S4, FSO, SIGO, ENG

Rationale: Each time the commander and the S3 discuss current or future plans, concepts, or courses of action, the FSO participates. The FSO develops the fire support tasks, responsibilities, and requirements. The S2 participates in the targeting cell to help develop the HPT list and to develop the observation plan and the fire support execution matrix. The ENG assists with direct/indirect fire integration with obstacles, priorities, and obstacle resourcing. Fire support planners must formulate tactical plans to reflect logistics limitations and to exploit logistics capabilities. Ammunition, fuel, food, water, maintenance, transportation, and medical support are all critical to sustaining fire support operations. Logistics sustainment is a central,

potentially decisive aspect of operations, not an adjunct to them. The SIGO advises on all communications and electronics matters and is responsible for providing retransmission capabilities to the task force. He ensures that communication resources and support are adequate to meet mission requirements. If assigned, the CHEMO participates in the targeting cell. At the brigade level and above, the ALO participates in identifying triggers, helping to plan the simultaneous employment of air and surface fires.

References: Commander's Battle Staff Handbook (pp. 83, 98); FM 3-90.2 (Appendix G); FM 101-5 (pp. 4-22 to 4-24)

15. Determine route prioritization for movement.

Task Definition: The objective of a successful move is for the unit to arrive at its destination in a condition suitable to its probable employment. The goal of all movement planning is to retain flexibility to execute a variety of plans to meet ever-changing conditions. Movement planning involves determination of the destination, routes, orders of march, rates of march, times that each serial or march element will arrive and clear its start point (SP), intervals, speeds, scheduled maintenance halts, communications, and location of the commander. An effective movement order requires the best available information on the enemy, terrain, weather, unit capabilities, and civil considerations.

Staff Officers Involved: S2, S3, S4, ADO, ENG

Rationale: The integration of and support from combat and CS, such as artillery, air defense, intelligence, military police, and engineers, are critical for a successful tactical movement. The S3 section develops the detailed movement order, with the assistance of the S4 section, in accordance with the commander's established priorities. In coordination with the ENG, the S4 ensures that routes are adequate to support the movement of the types and numbers of vehicles and supplies projected for movement.

References: FM 3-90 (p. 14-12 to 14-13)

16. Define the task organization requirements.

Task Definition: Task organization is the process of allocating available assets to subordinate commanders and establishing their command and support relationships. Determining task organization requirements during the war game involves identifying what combat power is needed, where, when, and how frequently it will be needed. Successful task organization requires understanding (a) the mission, including the higher commander's intent and concept of operations; (b) Army doctrinal tenets and tactics; (c) the battlefield framework; (d) the roles and interrelations of operating systems; (e) the status of available forces, including morale, training, and capabilities of equipment; (f) specific unit capabilities, limitations, strengths, and weaknesses; (g) the risks inherent to the plan; and (h) subordinate commander's abilities, especially the ability to apply combined arms doctrine.

Staff Officers Involved: XO, S1, S2, S3, S4, SIGO, FSO, ADO, ENG

Rationale: Every staff officer is responsible for recommending the organization for combat, allocations to subordinate units, and command and support relationships between subordinate units and organic units in their area of interest. The XO ensures information flow between the staff and commander on staff recommendations and the commander's decisions.

References: Commander's Battle Staff Handbook (p. 10); FM 101-5 (p. 4-4, Appendix F)

17. Define force protection criteria.

Task Definition: Force protection consists of those actions taken to prevent or mitigate hostile actions against personnel (to include family members), resources, facilities, and critical information. Defining force protection criteria requires the identification of threats and their associated hazards, determining the risk associated with each hazard, and balancing resource constraints against the risk. Resources allocated to force protection may be devoted to aggressive counterintelligence and threat assessments, operations security (OPSEC), troop dispersion, camouflage, local security, field fortifications, protection of electronic links and nodes (including combat troops with electronic devices), and army air and missile defense.

Staff Officers Involved: XO, S1, S2, S3, S4, SIGO, FSO, ADO, ENG

Rationale: The XO is responsible for supervising integration of risk management across the staff. Each staff officer helps the commander eliminate unnecessary risks, in part, by (a) analyzing his functional area and applying risk management during the MDMP; (b) identifying constraints in the higher commander's risk guidance; (c) including risks and recommending ways to reduce their impact in the staff estimate; (d) determining the effectiveness of hazard/risk controls and continuously assessing their suitability, feasibility, and acceptability; and (e) continuously identifying hazards, assessing initial and residual risks for each hazard, recommending control measures to reduce the risk to the force. The HHC (or FSC) CDR and the surgeon may help in identifying risk. If assigned, the CHEMO is a critical asset in assessing risk to the unit from enemy nuclear, biological, and/or chemical attacks.

References: FM 3-0 (p. 4-8 to 4-9); FM 100-14 (pp. 1-6, 3-6); FM 101-5 (pp. 4-7, 4-23, 4-24)

18. Determine effect of limited visibility on combat, combat support (CS), and combat service support (CSS) operations.

Task Definition: Commanders plan for the effects of adverse or limited visibility on weapons systems and optical and thermal devices. A plan that succeeds in clear conditions may be less effective during bad weather. Branches to the basic plan should address necessary modifications during periods of reduced visibility. Defining branches to the basic plan to address limited visibility involves changing execution criteria to reflect limited-visibility effects on weapons systems and optical and thermal devices, and developing an integrated plan for implementing the change.

Staff Officers Involved: XO, S2, S3, S4, FSO, ADO, ENG

Rationale: For maximum planning effectiveness, the scheme of maneuver must be resourced and integrated with fire support, obstacles, and air defense. The XO is ultimately responsible for integrating and synchronizing the warfighting plans. The HHC (or FSC) CDR also aid in determining the effect of limited visibility on CSS operations.

References: FM 3-0 (p. 8-14); FM 3-90.2 (p. 5-26 to 5-29); FM 101-5 (p. 4-2, 4-6, 4-10 to 4-15, 4-25)

BOS #4 – FIRE SUPPORT
19. Integrate fire support with maneuver and priorities.

Task Definition: Integration of fire support with maneuver and priorities requires that fire support planning is performed concurrently with the development of the scheme of maneuver.

Staff Officers Involved: S3, S4, FSO

Rationale: Each time the commander and the S3 discuss current or future plans, concepts, or courses of action, the FSO participates. The FSO develops the fire support tasks, responsibilities, and requirements. The S3 recommends integrated schemes of tactical maneuver and/or dispositions and fires, including nuclear and chemical fires. Fire support planners must formulate tactical plans to reflect logistics limitations and to exploit logistics capabilities. Ammunition, fuel, food, water, maintenance, transportation, and medical support are all critical to sustaining fire support operations. Logistics sustainment is a central, potentially decisive aspect of operations, not an adjunct to them. If assigned, the ALO may also contribute to this task.

References: Commander's Battle Staff Handbook (pp. 56, 83 to 84); FM 6-20 (Ch. 3)

20. Update High Payoff Target List (HPTL).

Task Definition: The HPTL is a prioritized list of high-payoff targets (HPTs). The HPTs are those targets whose loss to the enemy will contribute to the success of the friendly COA. Updating the HPTL requires joint consideration of updates regarding the enemy commander's needs (HVTs – to include enemy combat, CS, and CSS elements) and updates regarding the friendly concept of the operation.

Staff Officers Involved: XO, S2, S3, FSO, ADO, ENG

Rationale: The S2, S3, and FSO form the core of the targeting team. The S2 develops the ISR plan/overlay to find high-payoff targets and participates in the targeting cell to help develop the HPT list. Normally, the XO oversees the routine activity and coordination of the targeting process. As required, other representatives within the TOC may also be members of the targeting team, including the ENG, and ADO. If assigned, the CHEMO participates in the targeting meeting. At the brigade level and above, the ALO also participates in the targeting meeting.

References: Commander's Battle Staff Handbook (p. 83 to 90); FM 6-20-10 (Chs. 1 and 2); FM 101-5 (pp. 4-22 to 4-24)

21. Synchronize lethal and nonlethal fires to support task force Intelligence, Surveillance, and Reconnaissance (ISR) operations.

Task Definition: The desired effects of fires are to (a) suppress enemy forces engaging task force ISR forces; (b) protect the movement and infiltration of ISR forces and target acquisition assets; (c) inflict casualties and force enemy units to deploy early and reveal his main attack; (d) reduce the enemy's capability to gain information by eliminating enemy reconnaissance forces and intelligence-gathering assets; (e) deceive the enemy as to the location of task force units; (f) slow and canalize enemy movement to provide better targets for maneuver direct fire systems; and (g) suppress enemy direct and indirect fire weapons.

Staff Officers Involved: S2, S3, S4, FSO

Rationale: The FSO develops/synchronizes the fire support tasks, responsibilities, and requirements. The S3 has responsibility for developing the ISR plan with the FSO and S2. Fire support planners must formulate tactical plans to reflect logistics limitations and to exploit logistics capabilities. Ammunition, fuel, food, water, maintenance, transportation, and medical support are all critical to sustaining fire support operations. Logistics sustainment is a central, potentially decisive aspect of operations, not an adjunct to them. At the division level and above, the electronic warfare officer also participates in this task.

References: Commander's Battle Staff Handbook (pp. 59, 84); FM 6-20-40; FM 6-20-50; FM 101-5 (p. 4-25)

22. Synchronize lethal and non-lethal fires to support task force offensive operations.

Task Definition: Fires in support of offensive operations are to be planned for (1) terrain that will be traversed by task force units; (2) protecting task force flanks; and (3) achieving task force objectives. For fires planned for terrain that will be traversed by task force units, the desired effects are to (a) suppress, neutralize, or destroy enemy OPs and target acquisition systems; (b) suppress, neutralize, or destroy enemy direct fire systems; (c) deny enemy attack helicopters use of potential attack positions; and (d) suppress, neutralize, or destroy enemy elements that are to be bypassed. For fires planned to protect TF flanks, the desired effects are to protect TF units during movement and reduce the number of TF units committed to flank security. For fires planned on TF objectives, the desired effects are to (a) concentrate fires to suppress, neutralize, and destroy forward enemy elements; (b) create points of penetration into enemy defenses; (c) suppress enemy forces which will respond to penetrations or breakthrough of enemy positions; and (d) assist TF forces to maneuver to positions to provide direct fires against enemy forces in the defense.

Staff Officers Involved: S3, S4, FSO

Rationale: Each time the commander and the S3 discuss current or future plans, concepts, or courses of action, the FSO participates. The FSO develops the fire support tasks, responsibilities, and requirements. The S3 recommends integrated schemes of tactical maneuver and/or dispositions and fires, including nuclear and chemical fires. Fire support planners must formulate tactical plans to reflect logistics limitations and to exploit logistics capabilities. Ammunition, fuel, food, water, maintenance, transportation, and medical support are all critical to sustaining fire support operations. Logistics sustainment is a central, potentially decisive aspect of operations, not an adjunct to them. If assigned, the CHEMO is an important contributor because he plans and recommends integration of smoke and obscurants into tactical operations. At the division level and above, the electronic warfare officer and the psychological operations officer would also participate in this task.

References: Commander's Battle Staff Handbook (pp. 56, 83 to 84); FM 6-20 (Ch. 3); FM 6-20-40; FM 6-20-50; FM 101-5 (pp. 4-25, 4-27, 4-28)

23. Develop an observation plan that assigns (a) responsibilities to target acquisition systems; and (b) observers for the employment of indirect fires against designated targets and determination of damage assessments.

Task Definition: The observation plan should address where observers need to be, security, communications, how the observer gets into position, what the observer is to accomplish, and disengagement criteria if necessary. The steps in developing an observation plan are (a) identify the requirements for an observation post (OP); (b) conduct terrain analysis to determine possible OP locations; (c) allocate the asset; (d) select the OP from among the possibilities; (e) plan for insertion and occupation of the OP; (f) coordinate the passage of the OP through friendly forces, if required; and (g) plan indirect fires, electronic warfare support, medical support, extraction, security, and re-supply to support the insertion and occupation plan.

Staff Officers Involved: S2, S3, SIGO, FSO

Rationale: The observation plan is developed collaboratively among the FSO, S2, and S3. The S3 develops a scheme that will optimize observation and fields of fire, based on terrain, visibility conditions, and weapon system capabilities (for both friendly and enemy forces). The SIGO ensures selected areas afford the most in communications potential and the least in potential enemy EW interference. At the brigade level, the scout platoon leader should also participate in this task.

References: Commander's Battle Staff Handbook (p. 28, 59, 65, 88, 121); FM 3-90.2 (p. 9-10 to 9-11); FM 6-20 (Ch. 3)

24. Verify sensor taskings to provide targetable intelligence in a timely manner for high payoff targets (HPTs).

Task Definition: Tasking the right sensor for a collection task at the right time is a critical function in the targeting process. Clear and concise taskings must be given to each agency controlling sensors within the force or unit. Effective sensor tasking requires that staffs choose

small areas selectively on the basis of analysis of the IPB product most likely to produce the desired targets.

Staff Officers Involved: S2, S3, FSO

Rationale: Constant coordination is required among operations, intelligence, and fire support staff sections to ensure the effective employment of surveillance and target acquisition resources.

References: FM 6-20 (Ch. 2)

BOS #5 – MOBILITY/SURVIVABILITY

25. Assess potential enemy actions against the task force's efforts to bypass or overcome obstacles.

Task Definition: The assessment of potential enemy actions against TF efforts to bypass or overcome obstacles requires consideration of (a) the implications of enemy mission and intent for enemy obstacle placement and defensive action; (b) estimated enemy intelligence regarding friendly mission, intent, and capability; (c) estimated enemy capability and combat power relative to friendly capability and combat power; and (d) terrain and weather constraints on the enemy's options for responding to TF efforts.

Staff Officers Involved: S2, S3, FSO, ENG

Rationale: The ENG, along with the S2, combines the doctrinal enemy template, the terrain analysis, and the other battlefield effects to gain an appreciation of how the enemy will use the terrain to fight. The S3 uses intelligence provided by the S2 to analyze the enemy's most recent activities and intentions and evaluate possible enemy COAs. Each time the commander and the S3 discuss current or future plans, concepts, or courses of action, the FSO participates.

References: Commander's Battle Staff Handbook (pp. 59, 83); FM 5-71-2 (Appendix A)

26. Define reconnaissance requirements to identify points of penetration into enemy obstacles and river crossing sites.

Task Definition: Defining the reconnaissance requirements to identify points of penetration involves identifying gaps between what is known about how the enemy will employ obstacles, fortifications, and mobility assets during his defense and what needs to be known in order to support timely, critical maneuver decisions that must be made during the offensive operation.

Staff Officers Involved: S2, S3, S4, FSO, ENG

Rationale: The ENG identifies obstacle intelligence and nominates priority intelligence requirements for inclusion into the CCIR. The engineer, along with the S2, combines the doctrinal enemy template, the terrain analysis, and the other battlefield effects to gain an appreciation of how the enemy will use the terrain to fight. The ENG works with the S3, S4, and

FSO to develop the engineer plan, to provide resources to support the plan, and to coordinate fires with breaching and obstacles.

References: FM 5-71-2 (Ch. 3, Appendix A)

27. Integrate engineers into maneuver formations to maintain momentum, with the bulk of mobility assets with the breach force.

Task Definition: A highly mobile engineer force, well forward and integrated into maneuver formations is critical to maintaining the momentum of the attack. Engineers assist in maintaining momentum by supporting combined arms breaching, land handover, forward passage of follow-on forces, and clearing and gap crossing. Integration of engineers into maneuver formations requires that specific arrangements be made for handing over obstacles from forward breaching units to engineers for lane improvement and obstacle clearance. The amount and type of engineer equipment needed in the offense must also be considered.

Staff Officers Involved: S3, S4, FSO, ENG

Rationale: The ENG works with the S3, S4, and FSO to develop the engineer plan, to provide resources to support the plan, and to coordinate fires with breaching and obstacles.

References: Commander's Battle Staff Handbook (pp. 98, 100 to 101); FM 5-71-2 (Ch. 3)

28. Determine Family of Scatterable Mines (FASCAM) employment.

Task Definition: Scatterable mine systems enable tactical commanders to emplace minefields in enemy held terrain, contaminated territory, or in other areas where it is not possible to emplace conventional minefields. The FASCAM is designed to be delivered or dispensed remotely by aircraft, artillery, or by ground dispenser, and may be delivered by itself or in conjunction with other munitions. Planning the employment FASCAM minefields requires consideration of delivery error, availability of tubes, competing demands for field artillery, and the duration of the mines.

Staff Officers Involved: S2, S3, FSO, ENG

Rationale: The effective employment of FASCAM assets requires careful coordination among the ENG, FSO, S3, and S2. The ENG is responsible for providing expertise on the employment of all types of FASCAM. He determines location, size, time and density of the minefields. He coordinates with the S3 and FSO to ensure systems are available at the time and location for placement. The FSO provides the technical expertise to the ENG concerning the employment of field artillery (FA)-delivered FASCAM. Normally, the FSO obtains the safety zone (size) of the minefield. Because FASCAM can be delivered by air, the ALO (at the battalion level or above) or the S3 Air (if assigned) should also participate in determining FASCAM employment.

References: Commander's Battle Staff Handbook (pp. 60, 96); FM 3-90.2 (p. 9-43); FM 6-20-30 (Appendix C)

29. Define emplacement criteria for obstacles and mines to protect the task force flanks and block enemy counterattacks.

Task Definition: Obstacles must support present and future tactical plans, be logistically supportable, and fully coordinated. Some important factors to be considered when defining emplacement criteria include (a) type of mission; (b) type of obstacle; (c) requirements of future plans; (d) enemy strengths and weaknesses; (e) terrain and weather; (f) available time, materials, manpower, and equipment; (g) and effects on the local population.

Staff Officers Involved: S2, S3, S4, FSO, ADO, ENG

Rationale: These elements of the combined arms battalion/task force must be involved in the obstacle planning and employment process in order to extract the greatest cost from the enemy. Obstacles must be resourced, and integrated with the scheme of maneuver, fire support, and air defense. If assigned, the CHEMO is also an important contributor because he plans and recommends the use of flame-field expedients to supplement unit defense and existing minefields and barriers.

References: Commander's Battle Staff Handbook (p. 85); FM 5-103 (Ch. 4); FM 101-5 (pp. 4-23, 4-24)

30. Determine requirements and priorities for force protection, to include survivability positions for vehicles, weapons, systems, and equipment.

Task Definition: The determination of requirements for force protection includes consideration of each asset's (a) exposure to direct, indirect, and tactical air fire; (b) vulnerability to discovery and location; (c) capability to move to avoid detection, or to displace before counterfire arrives; (d) armor suitability to cover direct small caliber fire, indirect artillery and mortar fire, and direct fire antitank weapons; (e) distance from the forward line of own troops (FLOT) which affects the likelihood of acquisition as a target, vulnerability to artillery and air bombardment, and chance of direct contact with the enemy; (f) availability of natural cover; (g) any unique equipment item, the loss of which would make other equipment worthless; and (h) ability to establish positions with organic equipment. The enemy's engagement priority, including which forces the threat most likely will engage first, should also be considered. Based on a vulnerability analysis of systems that need protecting in the tactical situation, the maneuver commander develops the priorities for protective activities. Setting survivability priorities is a maneuver commander's decision based on the engineer's advice.

Staff Officers Involved: XO, S2, S3, S4, FSO, ENG

Rationale: Planning survivability missions requires staff input on the following considerations: military intelligence (enemy activity, terrain, weather, and weapon types), operations (tactical maneuver, fire support, and engineer support), and administration/logistics. The XO is ultimately responsible for integrating and synchronizing the warfighting plans.

References: FM 5-103 (Ch. 2)

BOS #6 – AIR DEFENSE

31. Determine air defense support and priorities.

Task Definition: Air defense priorities are established to ensure effective and continuous support of offensive and defensive operations. Determining air defense support involves determining for each air defense asset (a) criticality – the degree to which the asset is essential to mission accomplishment; (b) vulnerability – the degree to which an asset is susceptible to attack or to damage if attacked; (c) recuperability – the degree to which the asset can recover from inflicted damage in terms of time, equipment, and available manpower to again perform its mission; and (d) threat – the probability of an asset being targeted for attack by enemy air must be assessed if economical allocation of air defense officer (ADA) resources is to be achieved. The criticality, vulnerability, recuperability, and threat of each asset must be weighed against its total contribution to the battle. Priorities for protection may include maneuver elements, fire support, engineer elements, C2 nodes, and logistics assets. The air defense plan must support the commander's scheme of maneuver.

Staff Officers Involved: XO, S2, S3, S4, FSO, ADO

Rationale: The ADO works with the S2 to determine air threat, and assists the S3 in planning the air defense portion of the operation. Tactical-level air and missile defense is primarily the responsibility of ADA, but maneuver, fire support, aviation, and intelligence elements must participate directly. Logistics provides the means for all air and missile defense operations. Each participant has a specific role in tactical air and missile defense plans and operations. These integrated roles are mutually supporting. The ADO must work closely with the S3 to determine air defense asset allocation, positioning, and missions in accordance with the priorities established by the commander. In addition, the ADO coordinates with the S3 Air (if assigned), FSO, and forward air controller for the appropriate air defense posture and Army airspace C2. The XO is ultimately responsible for integrating and synchronizing the warfighting plans.

References: Commander's Battle Staff Handbook (pp. 60, 112); FM 3-90.2 (p. 9-50 to 9-51)

32. Define early warning requirements.

Task Definition: Early warning of enemy air attack is a passive air defense measure. It is vital if the principles of early engagement and defense in depth are to be achieved. Defining early warning requirements involves joint consideration of the possible air threat and the capability of available air defense assets.

Staff Officers Involved: S2, S3, ADO

Rationale: The ADO works with the S2 to determine air threat. The ADO evaluates and recommends passive measures for incorporation into the maneuver commander's plans and SOPs, including early warning systems. He advises the commander and staff on the impact of early warning on air defense operations and plans early warning operations within air defense. The ALO (at the brigade level or above) or the S3 Air (if assigned) contribute to this task.

References: FM 44-100 (Chs. 3 and 6); FM 101-5 (p. 4-22, 4-23)

33. Determine air defense decision points.

Task Definition: Decision points (DPs) are events or locations on the battlefield where tactical decisions are required during mission execution. They indicate when and where a decision must be made to have maximum impact on friendly or enemy COAs. Determination of decision points therefore requires selecting from multiple events or locations those events or locations where a decision is critical to tactical success. Air DPs are determined in the same manner as for ground operations. However, due to the high speeds of air systems, DPs must be placed significantly farther in advance of the targeted area of interest (TAI).

Staff Officers Involved: XO, S2, S3, FSO, ADO, ENG

Rationale: Tactical-level air and missile defense is primarily the responsibility of ADA, but maneuver, fire support, aviation, and intelligence elements must participate directly. The ADO must work closely with the S3 to determine air defense asset allocation, positioning, and missions in accordance with the priorities established by the commander. In addition, the ADO coordinates with the S3 Air (if assigned) or ALO (at the brigade level and above), FSO, and forward air controller for the appropriate air defense posture and Army airspace C2. The XO is ultimately responsible for integrating and synchronizing the warfighting plans.

References: Commander's Battle Staff Handbook (pp. 56, 60); FM 5-0 (p. 3-38); FM 44-100 (Ch. 6, Appendix A); FM 101-5 (p. 4-2, 4-6, 4-22, 4-23)

34. Determine air defense movements in support of task force operations.

Task Definition: Tactical-level ADA units must have mobility equal to the mobility of the supported force. Movement ensures that tactical-level ADA forces can project their operation into any area required by the maneuver force or indicated by the threat. The ability to move also signifies that ADA weapons systems are not tied to a static support base. The first priority for mobility should be planning moves that support accomplishment of the mission. Tactical situations may dictate additional moves to enhance survivability.

Staff Officers Involved: S3, ADO

Rationale: The ADO must work closely with the S3 to determine air defense asset allocation, positioning, and missions in accordance with the priorities established by the commander. At the brigade level, the S4 and FSO may also be involved in determining air defense movements.

References: Commander's Battle Staff Handbook (p. 110, 112); FM 3-90.2 (p. 9-48 to 9-51); FM 44-100 (Chs. 4 and 6)

35. Determine direct and indirect fire systems in an air defense role.

Task Definition: Combined arms elements can provide vital self-protection from air threats and contribute to freedom of maneuver. Although they have a limited capability to engage fixed-wing aircraft, missiles, and unmanned aerial vehicles (UAVs), combined arms elements can effectively engage hovering or slow-moving helicopters within their weapon systems' ranges. Tank main guns, infantry fighting vehicles (IFV), antitank weapons, and other direct-fire systems must engage these threat air platforms when possible. Fire support enhances tactical-level air and missile defense. Indirect fire weapons can deny enemy helicopters the use of masked, standoff positions. Fire support systems can concentrate their fires on enemy landing zones, pickup zones, launch sites, command and control, assembly areas, and forward arming and refueling point (FARP). Considerations for determining direct and indirect fires systems in an air defense role include (a) the nature of the target; (b) the distance of the target; (c) target visibility; and (d) the desired effect of fires.

Staff Officers Involved: S2, S3, FSO, ADO

Rationale: The task force commander and his ADO integrate the firepower of all available fire systems to defeat the enemy air threat. The ADO works with the S2 to determine air threat. The ADO assists the S3 in planning and executing the air defense portion of the operation. He coordinates with the S3 Air (if assigned), ALO (at the brigade level and above), FSO, and forward air controller for the appropriate air defense posture and Army airspace C2.

References: Commander's Battle Staff Handbook (p. 60); FM 3-90.2 (pp. 9-49 to 9-50); FM 44-100 (Ch. 6); FM 101-5 (pp. 4-22, 4-23)

36. Define air defense fratricide prevention criteria.

Task Definition: The lack of coordination between friendly forces is one of the major factors causing fratricide. Air defense must be continually synchronized with aviation operations to preclude fratricide of friendly aviation assets. Risk of fratricide is determined first by identifying hazards, then by assessing each hazard to determine the risk of potential loss based on the hazard's probability and the severity. Developing controls that will eliminate or reduce the risk of the hazard requires consideration of the reason for the hazard and specifying the who, what, when, where, and how for each control.

Staff Officers Involved: XO, S3, ADO

Rationale: The ADO plans and coordinates airspace with the aviation liaison officer, the ALO (at the brigade level and above), the S3 Air officer (if assigned), and other airspace users. The S3 aids in deconfliction by providing input on the effects of operations for airspace. The XO is responsible for integrating fratricide countermeasures into the plan.

References: Commander's Battle Staff Handbook (pp. 55 to 61, 110); FM 101-5 (p. 4-2, 4-22, 4-23, Appendix J)

BOS #7 – Combat Service Support (CSS)
37. Determine the adequacy of the area for CSS operations.

Task Definition: The six essential CSS functions are arm, fuel, fix, move, sustain, and man. Determination of the adequacy of the area for CSS operations therefore requires evaluation of the area's capability to support the safe, secure, and rapid transportation and delivery of supplies (CL I, II, III, III (B), IV, V, VII, VIII, and IX [see Appendix A]), tools, equipment, and personnel between the battalion support area, the task force support area, and task force units.

Staff Officers Involved: XO, S1, S2, S3, S4, ENG

Rationale: The XO, S1, and S4 are the principal CSS planners. Assurance of safe, secure, and rapid transportation and delivery of support requires that CSS planners know (a) the mission, task organization, and concept of operations for all subordinate units in the task force; (b) known and anticipated branch plans and sequels; (c) known and anticipated enemy situation and capabilities. The S3 and S2 assist in determining the adequacy of the area for CSS operations by providing the principal CSS planners this information. In addition, the S2 and/or ENG provide useful information regarding terrain and weather implications for CSS operations. The HHC (or FSC) CDR and the surgeon may also help with this task.

References: Commander's Battle Staff Handbook (pp. 56, 58, 74); FM 3-90.2 (pp. 10-13 to 10-34)

38. Determine transportation requirements and priorities.

Task Definition: The determination of transportation requirements and priorities requires consideration of (a) movement of CL IV and V obstacle materials and engineer equipment to designated work sites or supply points by the required times; (b) the potential to evacuate enemy materiel and personnel; (c) the transportation necessary to support offensive operations with aerial re-supply, forward positioning of CL III and CL V, repositioning of other supplies forward, and refuel-on-the-move (ROM) operations; (d) the transportation necessary to support defensive operations with CL IV and CL V items and engineer equipment for defensive preparation, repositioning of CL IV and CL V items and engineer equipment to subsequent defensive positions, evacuation of supplies and equipment to planned fallback points, and evacuation of medical units with alternate means of transportation; (e) the transportation necessary to support anticipated surge requirements; (f) the need to position logistics facilities; (g) the impact of extended operations or line of communications (LOCs) on driver/operator rest factors; (h) the impact of terrain or extended operations on operators and readiness of transportation assets; (i) the need for route improvement; (j) movement distances, routes, and required delivery times to work sites/supply points; (k) the type and quantities of materials required to be moved; and (l) the availability of special equipment (e.g., heavy equipment and transport).

Staff Officers Involved: XO, S3, S4, ENG

Rationale: The XO and S4 are the principal CSS planners for materiel. Determination of transportation requirements and priorities, as described above, requires that CSS planners know (a) the mission, task organization, and concept of operations for all subordinate units in the task force; (b) known and anticipated branch plans and sequels; (c) the engineer plan and material requirements for building obstacles; (d) terrain and weather implications for transportation; and (e) the integrated maneuver/fire support plan. The S3 and ENG assist in determining transportation requirements and priorities by providing the principal materiel planners this information. The battalion/task force maintenance officer is a critical asset in the S4 section supporting this task.

References: ARTEP 63-216-MTP; ARTEP 71-3-MTP; CGSC ST 101-6 (pp. 1-11); Commander's Battle Staff Handbook (pp. 66 to 72); FM 3-90.2 (pp. 10-26 to 10-34); FM 90-7 (Appendix C)

39. Determine medical support requirements.

Task Definition: Determining medical support requirements involves estimating casualties, including task force scouts and other forward reconnaissance elements, and defining medical evacuation (MEDEVAC) support.

Staff Officers Involved: XO, S1, S4

Rationale: The XO, S1, and S4 are the principal CSS planners, with the S1 having medical planning and casualty management as key staff responsibilities. The surgeon is an asset in the S1 section who helps to determine medical support requirements.

References: Commander's Battle Staff Handbook (pp. 28, 31-34); FM 3-90.2 (p. 10-26, 10-30)

40. Identify points in the battle when surge requirements are likely to be generated.

Task Definition: Surge requirements are likely to be generated at such points in the battle as (a) seizing an objective at the completion of an attack (e.g., surge to reposition critical supplies for consolidation and reorganization or surge in CL III and CL V to support unexpected success/pursuit of the enemy); (b) initiation of hasty defense or mission change from offense to defense (e.g., surge in CL IV, CL V, and engineer equipment to support defense preparation); and (c) attack of prepared defensive position with major obstacles (e.g., potential surge in medical personnel, supplies, and facilities to support a mass casualty situation). Identifying these or other points of likely surge requirements involves anticipating the implications of friendly and enemy actions (expected and unexpected) for personnel and supply requirements. The battalion/task force maintenance officer is a critical asset in the S4 section supporting this task.

Staff Officers Involved: XO, S2, S4

Rationale: The XO and S4 are the principal CSS planners for materiel. The S4 section is responsible for, among other things, providing ammunition, fuel, food, water, maintenance, and transportation services to companies, conducting emergency re-supply, and anticipating supply

requirements. Interaction with the S2 provides the intelligence required to forecast losses and subsequent re-supply. At higher echelons (DIV, CORPS), the S1 is involved in planning for surge requirements for personnel. The battalion/task force maintenance officer is a critical asset in the S4 section supporting this task.

References: Commander's Battle Staff Handbook (pp. 65 to 77); FM 3-9.2 (p. 10-26)

41. Determine tactical restrictions on Combat Service Support operations.

Task Definition: Tactical restrictions include (a) terrain that cannot be used for logistics operations because it is being occupied by a tactical unit; (b) roads which are dedicated to a company's movement to the LD during a specific period and not available for use by logistical vehicles; and (c) weather conditions that prevent logistics operations in specific areas due to trafficability.

Staff Officers Involved: XO, S3, S4, ENG

Rationale: The XO and S4 are the principal CSS materiel planners. The S4 section is responsible for, among other things, providing ammunition, fuel, food, water, maintenance, and transportation services to companies, conducting emergency re-supply, and anticipating supply requirements. Determination of the tactical restrictions on CSS operations involves integration of the CSS plan with the maneuver plan, a shared responsibility of the CSS planners and the S3. The ENG can provide useful information regarding the effects of weather conditions on the trafficability of support vehicles. The battalion/task force maintenance officer is a critical asset in the S4 section supporting this task.

References: Commander's Battle Staff Handbook (pp. 56, 65 to 77); FM 3-9.2 (p. 10-26); LL-CALL Newsletter No. 88-3 (p. 31)

42. Compare required and available Combat Service Support capability to identify shortfalls and ways and means to mitigate the effect of these shortfalls.

Task Definition: Comparison of required and available CSS capability requires integration of the CSS plan with the integrated maneuver plan.

Staff Officers Involved: XO, S2, S3, S4, SIGO, FSO, ADO, ENG

Rationale: The XO, S3, and S4 coordinate closely to ensure that tactical plans are logistically supportable. The S4 section is responsible for, among other things, providing ammunition, fuel, food, water, maintenance, and transportation services to companies, conducting emergency re-supply, and anticipating supply requirements. Every staff member is responsible for identifying requirements for additional units, equipment, or support in their areas of interest, though the S1 becomes more involved in planning personnel requirements at higher echelons (DIV, CORPS). The ENG and FSO provide information as to what support and transportation priority they may need during the operation. The battalion/task force maintenance officer is a critical asset in the S4 section supporting this task.

References: Commander's Battle Staff Handbook (pp. 56, 58, 65 to 77); FM 3-9.2 (p. 10-26); FM 101-5 (p. 4-6)

Appendix C

Wargaming Tacit Knowledge Assessment

Note: Correct answers have been bolded.

1. According to FM 5-0, wargaming is, in part, a tool to help staffs determine the strengths and weaknesses of multiple courses of action (COAs). Then, the multiple COAs are compared and a "best" COA selected. Time is often limited, however, and staffs are given only a single COA to war game. What is the purpose of wargaming a single COA?

a. To update staff estimates, based on what is learned in the wargame.
b. To rehearse the mission, testing assumptions about the enemy and terrain.
c. To refine the plan and synchronize the battlefield operating systems.
d. To ensure that the commander's COA is the best way to accomplish the mission.

2. The wargaming process is conducted using multiple iterations of an action-reaction-counteraction (ARC) cycle. Why?

a. The iterative ARC cycle involves a logical sequence of action.
b. The iterative ARC cycle reveals the impact of timing on friendly and enemy action.
c. The iterative ARC cycle supports wargaming both offensive and defensive battles.
d. The iterative ARC cycle simulates how the mission will play out if the enemy follows a particular (e.g., most probable) COA.

3. What is the purpose of estimating losses during the wargaming process?

a. To calculate relative combat power during each phase of the operation.
b. To determine materiel shortages (e.g., breaching assets).
c. To establish medical supply and transportation requirements.
d. To visualize how losses will affect the commander's decision-making.

4. Each of the seven BOSs are considered during the wargaming process. Why?

a. So every staff officer is aware of each other's responsibilities.
b. So the integrated contribution of each BOS to the fight can be determined.
c. So each staff officer can determine what he has to track during the battle.
d. So the BOSs can be deconflicted.

5. What is a key difference between a synchronization matrix and a COA statement/sketch?

   a. A synch matrix has more detail.
   b. A synch matrix includes all of the BOSs.
   c. A synch matrix reflects a refined COA.
   d. A synch matrix better illustrates how mission events will happen over time.

Appendix D

Team-Related Motivation Survey

Item	Motivation Aspect[a]
Staff positions provide experiences that are important for developing command skills.	Utility of Performance
Good performance in a staff position is required for promotion to command.	Utility of Performance
Great staff members don't make history; Great commanders do.	Utility of Performance
Superior staff performance is a source of pride for individual staff members.	Utility of Performance
Good commanders don't need a staff to aid in planning; They can already visualize the battlefield and act decisively.	Utility of Performance
Staff performance is not a major factor in determining battle outcomes.	Utility of Performance
Technical knowledge (including doctrine and digital skills) is critical for superior staff performance.	Utility of Performance
Improved technical knowledge is worth the effort involved in acquiring it.	Perceived Effort-Performance Relation
Team cohesion is a critical characteristic of superior staffs.	Utility of Performance
Improved team cohesion is worth the effort involved in developing it.	Perceived Effort-Performance Relation
There is higher payoff for investing effort to acquiring technical knowledge than for investing effort in developing team cohesion.	Perceived Effort-Performance Relation
Staff performance can only be so good; External factors (e.g., rapid staff turnover) exert a strong limiting influence.	Utility of Effort

[a]Motivation aspect was not shown in the survey administered to research participants, but is shown here for reader reference. Rating scale was Definitely True, Largely True, Depends, Largely False, Definitely False.

Appendix E

Team Communication Checklist

Group #: _____ **Distributed War-Gaming, Task Force 1-93 Scenario**

Task	Information Shared	Comments
Determine critical events and decision points Completed? Phase I ____ Phase II ____	☐ Information about the timing and location of critical maneuver events ☐ Information on enemy COAs and enemy location to ensure coordinated BOS support to maneuver plan ☐ Information about priority or primary intelligence requirement (PIR) and friendly forces information requirements (FFIR) to link key decisions to enemy action and form Decision Support Template (DST)	
Assess potential enemy actions against the task force's efforts to bypass or overcome obstacles Completed? Phase I ____ Phase II N/A	☐ Estimated enemy intel regarding friendly mission, intent, capability (e.g., in situation template [SITTEMP]) ☐ Estimated enemy capability and combat power relative to friendly capability and combat power (e.g., in SITTEMP) ☐ Modified Combined Obstacle Overlay (MCOO) ☐ In-stride or deliberate breach reqs, (e.g., logistical resupply) ☐ Linkup, guiding, and marking methods set by recon forces to support follow-on maneuver and breaching assets	
Determine optimal employment of intelligence collection assets Completed? Phase I ____ Phase II ____	☐ Intelligence assets available for collection at the tactical level, their possible locations on the battlefield, and their possible use during the fight ☐ Location of ground-based systems (e.g., remotely monitored battlefield sensor system [REMBASS]) relative to named area of interest NAIs/TAIs to address constraints (e.g., line-of-sight) ☐ Location of assets relative to air defense/ fire support assets ☐ Required bandwidth of available com links ☐ Location of isolated intel collection assets	

Group #: _____

Task	Information Shared	Comments
Define branches to the maneuver scheme Completed? Phase I ____ Phase II ____	☐ Enemy templates/COAs indicating enemy decision points ☐ Scheme of maneuver and required logistical support to enable branch ☐ Scheme of maneuver and required combat slice support to enable branch (e.g., mobility reqs to breach obstacles, fire support target designation and synchronization, ADA coverage, force protection)	
Determine high priority targets Completed? Phase I ____ Phase II ____	☐ Templated location of the enemy and key enemy assets (e.g., artillery, C2 nodes) ☐ Concept of maneuver ☐ Resupply rates for select munitions	
Integrate fire support with maneuver and priorities Completed? Phase I ____ Phase II ____	☐ HVT and HPT designations and the synchronized plan to attack these targets ☐ Timing of key fire support activities, relative to maneuver operations (e.g., prepare objective before sending elements forward into the breach, smoke comes after high explosive (HE) rounds to ensure breach is obscured, etc.) ☐ Logistics required to support the artillery assets during long moves or displacement (e.g., ROM setup)	

Group #: _____

Task	Information Shared	Comments
Identify triggers for the initiation of direct and indirect fires Completed? Phase I ____ Phase II ____	☐ Critical enemy assets that should be monitored and targeted ☐ Required decision horizon/timing for FASCAM as necessary for rapid obstacle emplacement ☐ Second-order effects on formation/ massing of enemy weapons systems as a result of friendly actions ☐ Timing of movement for the enemy anti-tank (AT) phase line (PL) to their ABF position and when to initiate friendly direct/indirect fires ☐ Timing in a general sense/appropriate sequencing of fires for major systems	
Determine requirements and priorities for force protection, to include survivability positions for vehicles, weapons, systems, and equipment Completed? Phase I ____ Phase II ____	☐ Amount of equipment and key assets requiring enhanced survivability during consolidation/reorganization ☐ Logistical support reqs to ensure uninterrupted fueling and fixing as necessary to support blade assets (e.g., bulldozers, bucket loaders, Small emplacment excavators ([SEEs], or armored combat earthmovers [ACES]) during consolidation/reorganization	
Determine air defense support and priorities Completed? Phase I ____ Phase II ____	☐ Location of key friendly assets and units/nodes and the probability that they will be targeted by enemy air assets ☐ Air defense needs in the scheme of maneuver ☐ Air avenues of approach	

Task	Information Shared	Comments
Determine medical support requirements Completed? Phase I ____ Phase II ____	☐ Location of scouts and other forward recon elements and maneuver units in space/time and estimated casualties ☐ Ground assets available for MEDEVAC ☐ Availability of air MEDEVAC	
Determine CP locations and composition to support current and planned tactical operations Completed? Phase I ____ Phase II ____	☐ TOC survivability enhancements (e.g., generators) ☐ Incorporated terrain analysis products (e.g., shaded relief/contour maps) ☐ Communications capability (e.g., line-of-sight considerations) ☐ Logistics requirements (e.g., type of supplies needed forward) ☐ Battlespace activity (e.g., scheme of maneuver, fires coverage)	
Identify points in the battle when surge requirements are likely to be generated Completed? Phase I ____ Phase II ____	☐ Key offensive operational events w/ high likelihood of excessive ammunition or fuel requirements (e.g., preparing for the attack on objective (OJB) PITBULL, encountering reserve, etc.) ☐ Expected breaching munitions (e.g., Mine clearing line change (MICLIC) rounds or C4) ☐ Consolidation tasks/timing and need for resupply of fuel, ammo, provision of Class IV materials, and MEDEVAC	

Co-located Wargaming, 1-22 Cavalry Scenario

Group #: _____

Task	Information Shared	Staff Officers Involved	Comments
Determine CP locations and composition to support current and planned tactical operations Completed? ____	☐ Tactical reqs for C2, resupply, MEDEVAC, etc. ☐ Incorporated terrain analysis products (e.g., shaded relief/contour maps) ☐ Communications capability (e.g., line-of-sight considerations) ☐ Enemy C2 (location, composition) and how to interdict/target enemy C2 ☐ Battlespace activity (e.g., scheme of maneuver, fires coverage)	XO ☐ S1 ☐ S2 ☐ S3 ☐ S4 ☐ S5 ☐ ADO ☐ CHEMO ☐ ENG ☐ FSO ☐ SIGO ☐	
Determine focus of collection plan to support critical events and decision points of the supported maneuver forces Completed? ____	☐ Timing and location of critical infantry (IN) battalions (BN) maneuver events ☐ Timing of IN BN's critical events, decision points (DPs), and associated collection assignments (e.g., military intelligence (MI) vs. 1-22 Cavalry (CAV) vs. IN scouts) and templated enemy locations ☐ Brigade-directed recon assignments for 1-22 CAV (e.g. NAI/TAIs specified in the operations order (OPORD), and Irvington, Brandenburg, Ekron,and Flaherty as technical recon objectives) ☐ PIR, FFIR, and essential elements of friendly information (EEFI) as outlined in the brigade (BDE) OPORD	XO ☐ S1 ☐ S2 ☐ S3 ☐ S4 ☐ S5 ☐ ADO ☐ CHEMO ☐ ENG ☐ FSO ☐ SIGO ☐	
Determine high priority targets Completed? ____	☐ Templated location of the enemy and key enemy assets (e.g., artillery, C2 nodes, as shown in SITTEMP) ☐ IN BNs' concept of maneuver and HVTs ☐ Soft targets that would be affected by IO ☐ Shaping and non-lethal fires that could be used to achieve desired outcomes and what effects should be observed ☐ Likely crossing areas to intercept infiltrating/cross-border force augmentation from foreign insurgents	XO ☐ S1 ☐ S2 ☐ S3 ☐ S4 ☐ S5 ☐ ADO ☐ CHEMO ☐ ENG ☐ FSO ☐ SIGO ☐	

Group #: _____

Task	Information Shared	Staff Officers Involved	Comments
Determine optimal employment of intelligence collection assets Completed? ____	☐ Intelligence assets available for collection at the tactical level (both organic as well as those under Stryker brigade combat team (SBCT) control), their possible locations on the battlefield, and their possible use during the fight ☐ Location of ground-based systems (e.g., PROPHET/QUICKFIX II) relative to NAIs/ TAIs to address constraints (e.g., line-of-sight) ☐ IN BNs' schemes of maneuver ☐ Location of assets relative to air defense/ fire support assets ☐ Required bandwidth of available com links ☐ Location of isolated intel collection assets to ensure they are logistically supported	XO ☐ S1 ☐ S2 ☐ S3 ☐ S4 ☐ S5 ☐ ADO ☐ CHEMO ☐ ENG ☐ FSO ☐ SIGO ☐	
Determine and specify the role of RSTA squadron in the conduct of information operations (IO) Completed? ____	☐ Desired outcomes of IO ☐ Control/observation of structure of critical infrastructure and its status/operation ☐ Transfer of authority: the conditions that must be met for it to be successful and what indicators should be observed to measure when to withdraw ☐ Expected border crossing activity during interntl. border screening mission to understand activities at traffic controlled checkpoints on road networks	XO ☐ S1 ☐ S2 ☐ S3 ☐ S4 ☐ S5 ☐ ADO ☐ CHEMO ☐ ENG ☐ FSO ☐ SIGO ☐	
Integrate fire support with target acquisition (sensor-to-shooter/ decision maker linkage and synchronization) Completed? ____	☐ HVT and HPT designations Timing of key fire support activities, including tactical air control party (TAC-P), ADA, and 4-8FA, relative to cavalry maneuver ops ☐ ISR plans ☐ Second-order effects on formation/ massing of enemy weapons systems as a result of friendly actions ☐ Timing in a general sense/appropriate priorities of 4-8FA support ☐ Priorities for SBCT counter-batter fires and radar employment/positioning	XO ☐ S1 ☐ S2 ☐ S3 ☐ S4 ☐ S5 ☐ ADO ☐ CHEMO ☐ ENG ☐ FSO ☐ SIGO ☐	

Group #: _____

Task	Information Shared	Staff Officers Involved	Comments
Assess potential enemy actions against the task force's efforts to bypass or overcome obstacles Completed? ____	☐ Estimated enemy intel regarding friendly mission, intent, capability (e.g., in SITTEMP) ☐ Estimated enemy capability and combat power relative to friendly capability and combat power (e.g., in SITTEMP) ☐ MCOO ☐ Route or area recon priorities/areas of focus; possible bypass identification and marking	XO ☐ S1 ☐ S2 ☐ S3 ☐ S4 ☐ S5 ☐ ADO ☐ CHEMO ☐ ENG ☐ FSO ☐ SIGO ☐	
Determine requirements and priorities for force protection, to include survivability positions for vehicles, weapons, systems, and equipment Completed? ____	☐ Amount of personnel, equipment and key assets requiring enhanced survivability during consolidation/ reorganization ☐ Logistical support reqs to enhance force protection across the squadron (includes materiel, special skills, and labor estimates)	XO ☐ S1 ☐ S2 ☐ S3 ☐ S4 ☐ S5 ☐ ADO ☐ CHEMO ☐ ENG ☐ FSO ☐ SIGO ☐	
Determine air defense support and priorities Completed? ____	☐ Location of key friendly assets and units/nodes and the probability that they will be targeted by enemy air assets ☐ Enemy air avenues of approach ☐ Air defense needs in the scheme of collection ☐ Launch and retrieval sites for UAVs	XO ☐ S1 ☐ S2 ☐ S3 ☐ S4 ☐ S5 ☐ ADO ☐ CHEMO ☐ ENG ☐ FSO ☐ SIGO ☐	

Group #: _____

Task	Information Shared	Staff Officers Involved	Comments
Determine medical support requirements Completed? ____	☐ Location of scouts and other forward recon elements and maneuver units in space/time and estimated casualties ☐ Ground assets available for MEDEVAC ☐ Location of an aid station ☐ Availability of air MEDEVAC ☐ Availability of civilian healthcare *facilities*	XO ☐ S1 ☐ S2 ☐ S3 ☐ S4 ☐ S5 ☐ ADO ☐ CHEMO ☐ ENG ☐ FSO ☐ SIGO ☐	
Identify points in the operation when surge *requirements are likely* to be generated Completed? ____	☐ Expected breaching munitions (e.g., C4) to support breaching reqs. ☐ Reqs for fuel resupply, ammo resupply, medical evacuation or treatment, and provision of CL materials for hasty barrier/force protection demanded by the transition to stability operations and support operations (SOSO) after Phase II ☐ Expected ammunition resupply to support opportunistic firefights	XO ☐ S1 ☐ S2 ☐ S3 ☐ S4 ☐ S5 ☐ ADO ☐ CHEMO ☐ ENG ☐ FSO ☐ SIGO ☐	

Appendix F
Think Like a Commander (TLAC) Checklist

Distributed Wargaming, Task Force 1-93 Scenario

Group #: _____

Theme	Probe Question	Response Quality		
Keep a Focus on the Mission and Higher's Intent	**TF 1-14 is ambushed** by multiple simultaneous attacks by Fighters for the Liberation of Kentuckia (FFTLOK) militants during its tactical road march to attack position HOUND, **and their combat strength is significantly reduced-- enough to jeopardize their ability to seize OBJ BULLDOG. What should the TF 1-93 commander do about this situation?**	0 points ☐ TF 1-93 should detach forces to react to this Situation.	1 point ☐	2 points ☐ TF 1-93 must continue to perform their mission attack ([ATK] to seize OBJ PITBULL) regardless of the 1-14 situation. TF 1-93 should be prepared to assist in (or perform) the attack on OBJ BULLDOG as a follow-on mission.
	As expected, **enemy obstacles delay TF 1-93's assault on OBJ PITBULL. How long does this delay have to be to disrupt the mission and the Bde commander's intent?**	0 points ☐ Delays are inevitable; But they can be overcome by continuing to allocate organic assets as necessary to the breach effort.	1 point ☐	2 points ☐ Delays lasting longer than several hours will definitely impede; Would request Bde controlled assets to augment breaching/security efforts and send scouts to look for other possible routes/bypasses while breach is underway.
Model a Thinking Enemy	**Scout recon efforts in the vicinity of NAIs 3 and 4 have been compromised** due to capture of detailed route recon information and a spot report (SPOTREP) by local Northland sympathizers. **How would you adjust your COA as a result of this situation?**	0 points ☐ Failure to recognize need to adjust plans or to consider what options might be available even though original plans were compromised.	1 point ☐	2 points ☐ Incorporate a feint as a part of the breach plan, such that 1-93 appears to maneuver as portrayed in the first COA, but actually deploys its attack strength from a different direction.

Group #: _____

Theme	Probe Question	Response Quality		
Model a Thinking Enemy, Contd.	Observation of the **Eastern strongpoint** complex/ dismounted company shows it is **actually positioned at 720955** and not as templated in the SITTEMP. **What does this suggest about how the enemy intends to defend his terrain?**	0 points ☐ Follow the original plan; Fail to think of alternate ways the enemy might be able to defend the terrain.	1 point ☐	2 points ☐ Positioning suggests the enemy is fighting a reverse slope defense and is "hiding" the strongpoint to draw 1-93 deeper into his defense. An alternate COA would be to isolate or flank on the eastern edge the strongpoint before making any mechanized *maneuver into the area*
	As the first two company teams maneuver into their SBF position, they **receive incoming direct fire and detect a non-persistent agent. What plans beforehand would allow the TF flexibility to address this possibility?**	0 points ☐ Do not make any plans for nuclear, biological, chemical (NBC); Fail to plan obstacles and apportion forces for direct fire/covering obstacles during consolidation.	1 point ☐	2 points ☐ Plan decon sites and specify MOPP posture as part of the order. Presence of non-persistent agent suggests that the enemy may want to inflict short-term casualties, but reoccupy that ground in the near future, perhaps during *a counterattack. Plan for ways* to deny mobility to this terrain once occupied by friendly forces.
Consider Effects of Terrain	What actions could TF 1-93 take if **mudslides occurred along main supply route X (MSR X) and restricted their ability to resupply upon consolidation** on OBJ PITBULL?	0 points ☐ Fail to properly configure/ request appropriate assets to provide robust mobility support during offensive operations.	1 point ☐	2 points ☐ Plan for mobility assets (blades) to overcome unforeseen obstacles. The TF must balance need for mobility in the planned ops with need for mobility for unexpected reasons. Bde controlled assets to address *shortfalls are a possibility*

Group #: _____

Theme	Probe Question	Response Quality		
Consider Effects of Terrain, Contd.	**Rain has severely decreased trafficability** throughout the sector and forced all wheeled (supply vehicles in particular) to stay primarily on roads. Additionally, **mechanized maneuver is extremely limited**. As the operation is extended, **Northland sympathizers began mining these roads and using improvised explosive device (IEDs) in small ambushes. What should TF 1-93 do in response to these conditions?**	0 points ☐ Disregard the impacts of weather on the terrain and what its possible consequences might be for mobility and restricting movement by the TF.	1 point ☐	2 points ☐ Plan for additional engineer assets to augment initial breaching efforts and enhance mobility throughout the depth of the battlefield. Have conservative movement rates in mind for all vehicles (including mechanized vehicles) so that timing in the synchronization matrix has a reasonable range of flexibility to respond to reduced mobility.
	The SITEMP does not template any **possible or known positions for AT ambushes. What positions would be suitable for AT ambushes or combat security outpost (CSOP) related attacks between the line of departure (LD) and PL Iron?**	0 points ☐ Fail to think through how the terrain can support enemy objectives and how the enemy is arrayed w/special systems or direct fire systems that can significantly impact friendly forces if not accounted for.	1 point ☐	2 points ☐ Anticipate and identify possible enemy positions by enhancing the SITEMP and studying the MCOO more closely. Possible positions might be located at ES705897, ES685902, ES683916. Knowing the terrain and viewing it as the enemy defending it might reveal other possible considerations regarding how the enemy lays his force out in depth across the battlefield and shape the formation of a suitable COA.

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Theme	Probe Question	Response Quality		
Use All Assets Available	Due to heavy losses, **TF 1-93 is down to less than two combat effective company teams prior to passing TF 1-14**. The **3d BDE reserve (D/1-93) is committed** to attacks in the rear area. **What can be done to increase combat strength for defense of OBJ PITBULL in order to successfully hold the ground and pass TF 1-14?**	0 points ☐ Try to solve the problem with internal assets only and not enhancing survivability of what is on the ground.	1 point ☐	2 points ☐ Request higher priority for close air support (CAS). Enhance countermobility and survivability on OBJ PITBULL with ENG effort. Plan obstacles and request CL IV in advance. Reorganize ENGs to fight as IN and give them a distinct battle position/piece of ground/AA to defend. Give them a "be prepared to" (BPT) reorganize as IN mission in the order. Reorganize assets on the OBJ so that weapon systems are distributed and fueled/ fixed. Have CSS assets postured fwd in sector to respond to reorganization/ consolidation mission. Establish a re-arm, re-fuel, re-supply (R3) point fwd in sector. Position ambulance exchange point (AXPs) fwd in sector. Posture 1-14 for success by supporting their mvmt with log assets, freeing theirs for the fight at the next OBJ.
	If **Team A takes heavy losses prior to completing the breach**, how can **resources be re-allocated** such that the **breach can be completed as rapidly as possible** and **Team B can still attack OBJ PITBULL with acceptable relative combat power?**	0 points ☐ Fail to recognize the sig. of a deliberate breaching effort and what assets are required well fwd in sector to respond to contingencies as they present themselves.	1 point ☐	2 points ☐ Organize breaching assets so that there's redundant breaching capability fwd in sector. The company (CO) training manuals (TMs) should be organized and equipped with suppress, obscure, secure, reduce (SOSR) principles so that Tm B takes over the breaching duties and Tm C moves from a support by fire (SBF) postn to become the assault CO.

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Theme	Probe Question	Response Quality		
Use All Assets Available, Contd.	Scouts working forward in sector have taken heavy losses. **What additional MI assets could be employed in the fight to assist in collection efforts against enemy troop and vehicle movement?**	0 points ☐ Fail to investigate what additional brigade assets can do to assist in collection efforts or fail to develop a thorough/ specific collection plan with depth in assets.	1 point ☐	2 points ☐ Tie systems such as REMBASS or UAVs into the collection plan and to monitor specified NAIs/TAIs and coordinate with brigade for tasking the assets. The type of asset, NAI/TAI and who controls the asset must be specified in the collection plan.
	What specialized equipment exists in CS/CSS unit X and how that equipment might be deployed to support their operation?	0 points ☐ Disregard the use of any specialized equipment and fail to employ all available assets. One must know what capabilities exist in the force structure in order to leverage that capability on the battlefield.	1 point ☐	2 points ☐ Use a mechanized divisional modified tables of organization and equipment (MTOE) to select special equipment and understand how/where to employ this equipment. This could include unique MI equipment, ENG equipment, or quartermaster equipment such as a reserve osmosis water purification unit (ROWPU). Any number of assets could be singled out by students to highlight capability and doctrinal TTPs for employing this equipment.
Consider Timing	**When is it too late for the mortars to start providing HE and smoke on OBJ PITBULL?**	0 points ☐ Assume the smoke will be instantaneous and disregard the wind direction/speed as part of the planning process.	1 point ☐	2 points ☐ Consider the movement rate and setup time/smoke build-up time for mortars; calculate the time of travel reqd for the supported maneuver unit; backwards plan how much time is reqd to get proper smoke build-up prior to mvmt of the supported unit.

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Theme	Probe Question	Response Quality		
Consider Timing, Contd.	**What are the factors affecting success at the breach site? How should a unit be configured to support the breach?**	0 points ☐ Disregard specifying the configuration and roles of the elements of the breach team and do not draw up a rehearsal scheme for the breaching operations.	1 point ☐	2 points ☐ This question depends on the difficulty/depth/type of the obstacle, on the force defending it (direct and indirect fires) and the terrain conditions. There are doctrinal (e.g. FM 3-34.2) rates one can expect/use as planning factors for deliberate breaches with a certain type of ENG asset (e.g. MICLIC) or, in a mechanized unit, tank plows. One must also account for time reqd to proof (e.g. w/mine rollers prior to moving through the minefield. At minimum, for breaching ops, the staff should designate the breach force, support force, and assault force, and the specific assets assets (ENG equip, rollers/ plows, etc) are task organized to those forces. Also, the SOSR technique should be applied to understand roles of main and supporting forces.
	How long will it take to conduct the passage of lines? What impact will this movement have on follow-on operations?	0 points ☐ Assume full mobility of assets w/o any degradation/planning factor to account for changes; Assume that the enemy has no success in slowing momentum of the attack.	1 point ☐	2 points ☐ Use mvmt rate tables found in FM 34-8-2 for simple travel times for tracked/wheeled vehicles. Factor in terrain, enemy, and weather. It could be a very quick operation if enemy resistance is limited. If enemy resistance is strong, a deliberate POL will be required.

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Theme	Probe Question	Response Quality		
See the Big Picture	**If TF 1-93 takes longer to seize OBJ PITBULL than expected, and there is a delay in establishing lanes 20 and 21, what effect will this have on TF 1-14's supporting effort and the ultimate success of the Bde mission?**	0 points ☐ TF 1-14 tries to bypass as much of TF 1-93s position as possible or maneuvers out of sector to seize the next objective. Or if delayed, there is no adjustment made for follow-on missions and related support (i.e., smoke is launched at the wrong time).	1 point ☐	2 points ☐ TF 1-14's mobility and maneuver space is contingent upon TF 1-93's success. They will have a difficult time passing lines if the terrain is restricted and the momentum is slowed. Also, this may bottle up 1-14 behind friendly forces w/o much room to maneuver, exposing them to CAS or indirect fires. There could be coordination at the Bde CDR level to (+) 1-93 with a TM from 1-14 to finish the job they started and then pass 1-14 (-) fwd to seize the next obj. There There would need to be a new combat power analysis to assess if 1-14 still has a 3:1 advantage and discussion of what risk the CDR is willing to accept if he goes fwd with less combat power.
	En route to cross phase line HAMMER, **TF 1-94 is delayed by an hour, but TF 1-93 has already begun its attack to seize OBJ PITBULL. What actions must occur to preclude exposing a flank of TF 1-94 (and being set up for a counterattack)?**	0 points ☐ Assume the enemy will not take advantage of a flank exposure and just allow time to pass as the method of "catching up;" Try to use the bde reserve in a defensive role within the TF 1-93 sector (this jeopardizes the defense of the rear area).	1 point ☐	2 points ☐ Task organize one TM from 1-14 to 1-94 to give them some additional combat power; Or use 1-14 to secure 1-94's flank In general, fewer moving pieces/less complex solutions (i.e., not moving forces from one org to another) are much better alternatives. In general, a COA that preserves the momentum of the attack and keeps combat power fwd in sector is a better COA/response.

Theme	Probe Question	Response Quality		
Visualize the Battlefield	**What effect does the enemy's use of non-persistent agents at ES695947 have on Team A's combat posture? What about its effect on other friendly forces?**	0 points ☐ Ignore the enemy's choice of of a non-persistent (vs. persistent) agent in this attack. Use of a non-persistent agent might indicate a desire to re-occupy that position or use it as a mobility corridor for a counterattack.	1 point ☐	2 points ☐ This places TM A in a reduced state of readiness. Increasing the mission oriented protective posture (MOPP) posture will slow them in their task as a breach force and potentially may cause momentum to slide in the favor of the enemy. If the breach is complex, this could first delay the assault force for 1-93, and potentially delay the POL, jeopardizing the front of 1-94. It is possible the enemy might move forces against 1-94 w/o 1-14 in their sector, depending on the effectiveness of the enemy's earlier defense in that sector.
	How does the enemy select his decision points? What are his triggers for displacing to alternate locations if fighting a delay in depth?	0 points ☐ 1st Part: the enemy's DP are wherever restrictive terrain or chokepoints occur. 2nd Part: Trigger points occur whenever any friendly force encounters an obstacle.	1 point ☐	2 points ☐ 1st part: Conduct METT-TC analysis from the enemy's perspective. 2nd part: Look at logical places where the enemy might defend from if he chose to fight a delay vs. deliberate defense. Once you understand the terrain, then apply the idea of combat power ratios to understand when the enemy is likely to move.

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Theme	Probe Question	Response Quality		
Visualize the Battlefield, Contd.	**What factors determine the placement of a support by fire position for TM X?** *Note Team X could be CO Team A, B, C, or D, depending on how the teams are tasked in the COA.*	0 points ☐ Look solely at max effective range of a given weapon, drawing a range fan and place the SBF on the map.	1 point ☐	2 points ☐ Perform a good METT-TC analysis and refer to the MCOO to get the enemy disposition and likely obstacle plan and restricted vs. unrestricted terrain. Once these elements are known, the S3 can position the SBF posn in a location that offers some cover from direct or indirect fires. Further, the position must have clear fields of fire and able to offer the occupant the chance to shift fires flexibly to alternate locations beyond the primary designated location.
Consider Contingences and Remain Flexible	**When is TF 1-93 most likely to see a counterattack?**	0 points ☐ It is doubtful the enemy commander would counterattack on commitment of less than 3 company teams to the TF 1-93 sector (i.e., early in the crossing the LD phase). This would be a waste of assets and lose the advantage of surprise for the enemy.	1 point ☐	2 points ☐ Several times: it could happen when TF 1-93 is having the most success and moving fwd so quickly that they expose a flank to an enemy. A counterattack (CATK) could also happen upon consolidation or reorganization on OBJ PITBULL. Depending on the success of the attack by 1-93, it could also occur while a petroleum, oils, and lubricant (POL) is underway and there is a high concentration of friendly force in a small area. It is possible the enemy has constructed a mobile defense and as he fights a delay in depth allowing 1-93 to advance rapidly, he then commits the reserve to the 1-93 flank that is possibly exposed.

Group #: _____

Theme	Probe Question	Response Quality		
Consider Contingences and Remain Flexible, Contd.	**How would the S2 and S3 locate the commander's decision points?**	0 points ☐ Choice of DPs made w/o regard to thorough METT-TC analysis or without the idea of coordinated fires, without answering the commander's PIRs, and selection of HVTs.	1 point ☐	2 points ☐ Understand CCIRs and perform a METT-TC analysis. DPs are placed at a point representing the last possible point at which the commander can make his decision to attack the enemy at a TAI. They are also keyed on what is observed in an NAI (e.g., enemy activity in a vulnerable flank location where minimal force is deployed; this might trigger a friendly response to shift assets/fires to this location depending on the strength of the enemy detected in an NAI). Decisions must be made early enough to have the desired effect on the enemy. However, they cannot be made until there are indicators that a particular battlefield event will occur. Time is the critical factor in placing DPs.
	The ***enemy shows light resistance*** in the TF 1-93 sector. TF 1-14 conducts a rapid passage of lines and moves to BULLDOG with relative ease. TF 1-94 continues to get delayed in sector. **What are some things that you might be considering/thinking about given the enemy's light resistance?**	0 points ☐ Fail to prepare for a contingency or to think about a flexible plan that responds to the light resistance.	1 point ☐	2 points ☐ There could be a significant counterattack coming to a now-exposed flank. Also, there could be a large NBC event with persistent agent that would surprise the forces.

Theme	Probe Question	Response		
Keep a Focus on the Mission and Higher's Intent	In Annex L of the 3-23 OPORD, part of the CDR's intent states: "Focus: In priority order: Threat, Infrastructure, Society. This is a recon pull op to determine which COA to execute for the SBCT attack." HUMINT reports *indicate that Mayor Ronnie Joyner will side with the* winner of this conflict, and will help whoever he perceives to have the leading edge. Mayor Joyner is instrumental in getting gray-list civilians to provide partial information necessary to id and locate threat forces, but 1-22 CAV must compete with influential entrepreneur Henry Olive's very public spending and apparent imperviousness to enemy attack. What can 1-22 CAV do, given the CDR's priorities and limited time, to demonstrate that they can compete successfully against threat influence and win over the Mayor and get needed information from gray-list civilians? Suggested Staff Officer(s): S3/AS3	0 ☐ Attack Henry Olive or his interests using insurgent tactics, so it appears that the Gordian forces did it instead of U.S. forces and that Henry Olive is losing favor with the Gordians. Harass or intimidate citizens who have expressed support for Henry Olive. Fail to recognize that RSTA Sqdns have a significant human intelligence (HUMINT) component.	1 ☐	2 ☐ Keeping in perspective that the priority list is there to provide guidance on actions to take in relative order. Show an overt display of force brought out by high technology surveillance/target acquisition to the mayor and take direct action against the threat. Counter threat propaganda with your own CA/PSYOP messages and themes; reinforce the mayor's messages to co-op him as well. Provide security, equipment and training for the police chief's forces in exchange for threat info. This is a direct benefit to threat reduction and develops a political ally (which reduces the chance of the mayor using them as an instrument of power against you). The mayor will only be as strong as the instruments of power he has available to him.
	The rules of engagement (ROEs) state that "all persons are to be treated with dignity and respect." Your troops find, however, that the cultural traditions of the Kazarians require that they must treat women without dignity and respect as defined by American culture and values in order to win over the trust and allegiance of Kazarian men necessary to conduct recon ops. How can this possibility be planned for? Suggested Staff Officer(s): S1 or S3/AS3	0 ☐ Devise a psychological operations (PSYOP) plan for convincing Kazarian men to adopt American attitudes about women. Identify opportunities to publicly interact with Kazarian women or U.S. female soldiers in a way that Kazarian men would approve of. Consider plans for assisting Kazarian women who wish to escape their husbands/ fathers/brothers in exchange for info. Fail to recognize that RSTA Sqdns have a significant HUMINT component.	1 ☐	2 ☐ Devise HUMINT plans that avoid all contact with women; do not assist or overtly engage them in any discussions or negotiations. Avoid the use of U.S. female soldiers forward in sector; granted, they aren't supposed to be operating in combat units, they might well be present in some support roles (CS or CSS).

Group #: _____

Theme	Probe Question	Response		
Model a Thinking Enemy	What methods could the enemy use to defy screening efforts along the international border (IB)? Suggested Staff Officer(s): S2/AS2 or S3/AS3	0 ☐ Stating that if the screen is done right, the enemy can't defy screening efforts. Templating/expecting the enemy will frequently be traveling in large (greater than 2-4 person sized groups. Failure to account for enemy deception/ disabling of collection assets in the collection plan, and therefore not setting up redundant collection efforts along the border.	1 ☐	2 ☐ Harass/occupy/eliminate screeners by attacking the screen line then dodging across the IB into Gordia. Harass/occupy screeners by staging a demonstration that allows insurgents to slip into Kazar unnoticed. Stow away on UN/Coalition vehicles Disguise selves as members of Gordian humanitarian personnel (dealing with Skardian ethnic cleansing).
	What cover and concealment can the enemy take advantage of in order to deceive 1-22 regarding the size/strength of threat forces? Suggested Staff Officer(s): S2/AS2 or ENG	0 ☐ Solutions that do not include consideration of local populace. Solutions that do not consider the effects of urban terrain. Solutions that are not based on fighting an asymmetric enemy (e.g., students think in terms of large units, heavy equipment, etc.).	1 ☐	2 ☐ Use the civilian population to blend into the terrain. Maximize the use of forces within urban areas where intelligence collection and comm capabilities are weakened for U.S. forces. Disperse widely, remain in small teams, and move frequently such that effective estimates require an integrated intel effort.

Group #: _____

Theme	Probe Question	Response		
Consider Effects of Terrain	What are the effects of the urban terrain on 1-22 CAV technology-based sensing capability? Suggested Staff Officer(s): SIGO or ENG	0 ☐ Failure to consider building materials. Failure to consider 3D nature of urban Terrain.	1 ☐	2 ☐ Shadows of tall buildings will mask enemy activity during the day, reducing the effectiveness of UAVs for collection. Building materials deny "look through" capability for current UAV sensors to provide info on floor plans/occupants in buildings or below ground. Multiple 3D hiding places makes threat assessment/risk reduction for flying UAVs very difficult. Multiple line of sight limitations might adversely affect long-range sensors and communication capabilities to transmit information back to CPs.
	What are the implications of dense wooded terrain for movement for the RSTA unit and for conducting reconnaissance operations? Suggested Staff Officer(s): ENG or S3/AS3	0 ☐ Fail to account for reduced movement rates and increased recon times. Fail to plan for redundant collection/ sensors in heavily vegetated areas to offset collection limitations.	1 ☐	2 ☐ Impede friendly mounted movement and ability to move quickly. Mask enemy movement from aerial imagery sensors especially (excludes IR or thermal sensors). Mask friendly movement from enemy aerial observation and some ground detection. Long range reconnaissance limited in dense understory environments with certain types of optical sensors.

Group #: _____

Theme	Probe Question	Response		
Use All Assets Available	Consider what you would do if in the initial phase of the operation, all UAV assets are either damaged or destroyed. How could the unit offset this loss using other means of collection and processes? Suggested Staff Officer(s): SIGO or S3/AS3	0 ☐ Abandon surveillance plans with the loss of the UAVs. Request assets that are not available or have other priorities as indicated in the OPORD (e.g., rotary wing aviation assets).	1 ☐	2 ☐ Request additional UAVs and/or priority in maintenance efforts to rapidly repair what you can as soon as possible. Request augmentation from fixed wing aviation assets for aerial reconnaissance from the carrier group, JSOTF, and 6th AF. Queue aerial recon assets with ground-based collection devices (e.g., PROPHET) to focus confirmation of enemy activity picked up via signals intelligence. Maximize the fusion of collection across diverse intel areas of focus (e.g, imagery intel, imagery intelligence (IMINT); signals intel, signal intelligence (SIGINT); electronics intel, ELINT; etc.) to cross check and filter info and produce actionable intel. Mix with local populace and collect with them as part of the team (Use HUMINT).
	What civilian assets, equipment or facilities could be used to augment logistical sustainment in the operation? Suggested Staff Officer(s): S4	0 ☐ Failure to consider civilian assets as Viable. Any aid/care/health related activities or facilities to assist in treating military Casualties. Ammunition or Weapons.	1 ☐	2 ☐ Vehicles used for transportation or loading, in order to move supplies and aid humanitarian assistance required by support ops and transition to civilian control. Any aid/care/health related activities or facilities could be used to provide point of treatment for injured civilians on the battlefield. Housing/food/water from local populace for displaced civilian personnel. Maintenance facilities and fuel to support cavalry operations.

Theme	Probe Question	Response		
Consider Timing	What factors would affect the timing of collection efforts in preparation for the attack commencing at 180200? Suggested Staff Officer(s): S3/AS3 or ADO	0 ☐ Not recognizing that the interdependence of unit activities is a critical determinant of intel collection success and of force protection during collection Efforts. Focusing on the timing of units that should be concern of the troop CDRs (e.g., scout platoons (PLTs), etc.).	1 ☐	2 ☐ Successful movement/occupation of 4-8 FA into its respective position area for artillery (PAAs). Movement/occupation of ADA unit. Movement/Positioning/operation of Q36 and Q37 radars. Cooperation of civilian populace in HUMINT collection efforts. Movement/positioning/operation of RETRANS station (for transmitting intel collected and assisting Bde comms). Equipment breakdowns, people getting lost, unit stopping all action to wait until everyone's ready.
	What is the timing for key CSS activities to support the RSTA squadron's efforts throughout each phase of the operation? Suggested Staff Officer(s): S4	0 ☐ Not planning or scheduling logistical (time intensive tasks) far enough in advance of the actual phase. Not anticipating needs of follow-on reqs that exist and require log support (such as the screen mission; and the recon handoff mission as well).	1 ☐	2 ☐ Phase I. All pre-configured strategic loads must be built to facilitate early entry into area of operations(AO) NORMANDY NLT 160001JULXX. Phase II. All AXPs and forward maintenance areas must be established to sustain operations in sector NLT 170000JULXX. Phase III. All logistic package (LOGPAC) routes extended to support international border screen mission NLT 180000JULXX.

Group #: _____

Theme	Probe Question	Response		
See the Big Picture	The RSTA squadron is responsible for conducting area recon in AO Normandy to prepare infantry units for successful occupation of several objective areas. As 1-22 CAV performs their reconnaissance, they find little evidence of enemy presence in their AO (in open or urban terrain). For a proper handoff to take place as they move to the IB screen mission, what are some prudent actions they should be taking? Suggested Staff Officer(s): S2/AS2 of SIGO	0 ☐ Be grateful and relieved for the lack of activity and proceed to the border. Assume all equipment is working fine and not being defeated by countermeasures.	1 ☐	2 ☐ Inform infantry scouts they are not able to confirm the templates and suggest this lack of activity in sector is suspect. Consider chopping additional recon assets to the infantry unit to augment recon efforts in sector since large friendly forces are present and risk for attack has increased. Redouble efforts to confirm sensor collection is not being technically defeated by threat forces.
	The RSTA squadron does not have any Tactical PSYOP Team (TPT) or Civil Affairs Team (CAT) augmentation, yet potentially plays a big part in defeating the counterinsurgency. What can 1-22 do to augment PSYOP and CAT efforts? Suggested Staff Officer(s): FSO	0 ☐ Remain isolated from the civilian populace in order to avoid unnecessary conflict. Initiate a PSYOP effort whose propaganda unrealistically links to action (i.e., dropping leaflets whose messages can't realistically be backed up by action or haven't been previously demonstrated by action).	1 ☐	2 ☐ Communicate important themes stated in Annex P by working through the 97B HUMINT personnel during their engagements with civilian populace. Provide intelligence as to what indvs or groups in the populace could be targeted by PSYOP most effectively. Provide intelligence as to what indvs or groups in the populace will be most effectively swayed by threat PSYOP. Provide intelligence as to what PSYOP tactics will be more or less effective. Provide intelligence as to where Coalition stabilization efforts will be most visible. Develop standing operating procedures (SOPs) for distributing information gained at the individual level across the entire squadron, up the chain of command, and out to the other units.

Theme	Probe Question	Response		
Visualize the Battlefield	As stated in Annex P, Gordian special purpose forces (SPF) troops are able to blend in with 45% of the populace. What implications does this have for 1-22 CAV operations? Suggested Staff Officer(s): ENG or S2/AS2	0 ☐ Not recognizing that there may be identifiable diffs bet members of the populace who would aid the Gordians and those who would not, and that knowing these diffs would aid intel collection and info ops. Not recognizing that because the enemy can blend in with the local populace, the local populace is, in effect, enemy territory.	1 ☐	2 ☐ The success of the 1-22 CAV ops depends, in part, on finding a way to characterize which 45% of the populace would aid Gordian troops and to assess indvs in the populace for these characteristics in order to determine whether or not they're sympathizers and are giving up false info to deceive collection efforts. 1-22 CAV will have difficulty discriminating legitimate Gordian troops from those who are sympathizers; they will have trouble determining who the real enemy is. The success of the 1-22 CAV ops depends, in part, on undermining sympathy for Gordian ideologies and claims on Meade County. That the enemy can hide in plain sight suggests that 1-22 CAV stealth is likely compromised whenever they enter a built-up area and that some sort of deception effort should be used to shield the true intent/progress of the operations from enemy observers.
	On a general level, what would be the most effective timing/location for the enemy to attack the civilian populace in order to deny 1-22 CAV efforts to gather intelligence and perform the screen? Suggested Staff Officer(s): S2/AS2, S3/AS3, or FSO	0 ☐ Solutions that focus on the tactical impact of the attacks, but do not consider the political impact of the attacks..	1 ☐	2 ☐ Locations where the civilian populace is undecided regarding their support for U.S. efforts or that are meaningful to the undecided civilian populace Times that will maximally disrupt friendly efforts to stabilize and win the trust of the populace (e.g., times most distasteful to members of the local populace, such as holy days; times when friendly forces are distracted by other engagements such that they can't sufficiently address the problem).

Group #: _____

Theme	Probe Question	Response		
Consider Contingencies and Remain Flexible	If 1-22 CAV strength is weakened 15% by IEDs and SPF interdiction during Phase I operations, what effects will this have on Phase II and III operations, and what actions can be taken to address these effects? Suggested Staff Officer(s): S3/AS3	0 ☐ Failure to consider using the MI assets in the IN BNs. Failure to consider the impact on timing that weakened strength could have.	1 ☐	2 ☐ Limit the effectiveness of infantry units in target acquisition and destruction; Increase the use of non-organic collection efforts (aerial sensors and collection teams/personnel). Increase the job of the infantry scouts to take over missions not able to be completed by the RSTA; Augment RSTA squadron with infantry scouts.
	A key informant on threat force size/strength/positions is assassinated. What backup plan can be set up to address this contingency? Suggested Staff Officer(s): S2/AS2	0 ☐ Solutions that focus on how to secure informants at the cost of identifying means to deal with the loss of informants. Fail to recognize that RSTA Sqdns have a significant HUMINT component.	1 ☐	2 ☐ Develop multiple/redundant contacts/informants over time. Use variety of sensors to provide overlapping coverage to offset fleeting opportunities related to HUMINT.

Appendix G

Situation Awareness Exercise

SA Level	Question	Answer
1	What is the center of mass for NAI3?	719946
2	If the enemy strongpoint is located forward on high ground at NAI3, what would this reveal about the enemy intends to do?	Protect that key piece of terrain or die trying
3	What should TF 1-93 do if the eastern enemy strongpoint is located forward on high ground?	Establish two teams in SBF position to engage the strongpoint while directing fires into the western mechanized infantry company (MIC)
1	What is the center of mass for NAI4?	702956
2	If there are any dismounted infantry forces forward in sector, spotted at NAI4, what would this reveal about what the enemy intends to do?	The enemy intends to fight the combat security outpost (CSOP) forward in sector, and to use the mechanized forces of the eastern MIC as reinforcements
3	What should TF 1-93 decide to do if this happens, and where should this decision be made (i.e., DP center of mass)?	Fix eastern MIC with lead TM and maneuver remaining teams toward the western end of the objective (DP center of mass = 696893)
1	At what location (i.e., center of mass) should the disposition of the AT battery be observed?	New NAI, center of mass = 694974
2	If the enemy begins displacing an AT platoon at this location, what would this reveal about what he intends to do?	Commit a counterattack; expect considerable flanking force activity from the North West (NW)
3	What should TF 1-93 decide to do if this happens, and where should this decision be made (i.e., DP center of mass)?	Fix AT platoon with indirect fires; destroy with CAS (DP center of mass = 694961)
1	At what location (i.e., center of mass) should the commitment of the eastern MIC be watched for?	New NAI, center of mass = 725923
2	If the enemy holds mechanized forces from the eastern MIC in reserve and maneuvers around the eastern flank, what would this reveal about his intentions?	He is likely trying to assail a flank and run you against another stationary force to your west
3	What should TF 1-93 decide to do if this happens, and where should this decision be made (i.e., DP center of mass)?	Use one company team in SBF to respond (branch plan A) (DP center of mass = 716935)

1	At what location (i.e., center of mass) or locations should the commitment of the enemy reserve be watched for?	New NAI, center of mass = 666943 or 726978 or previous new NAI, center of mass = 694974
2	If the enemy commits a reserve to the TF 1-93 sector, what would this reveal about his intentions?	He cannot fail in this sector (this is the last line of his organic forces/defense in depth)
3	What should TF 1-93 do if this happens, and where should this decision be made (i.e., DP center of mass)?	Use assault force on PITBULL to fix the reserve; maneuver SBF teams to destroy it (DP center of mass = 710981)

Appendix H

Integrated Overlay Exercise Items and Rationale

Phase II – Attack to Seize OJB PITBULL

Overlay Element	Rationale/Justification	Staff Officer Responsible
Command Posts (CPs) (TAC & Main) ___ Element (TAC CP) placed on the overlay? ___ Element (Main CP) placed on the overlay? (.5 point each)	___ CP positions are within optimal communication range (.2 point each) ___ CP positions allow them to stay in contact during critical operations ___ CP positions are tactically defendable ___ CP positions are located where cover and concealment are offered ___ CP locations are supported by indirect fires and air defense assets	XO
Ambulance Exchange Point (AXP) ___ Element placed on the overlay?	___ AXP position is located on a terrain feature behind the main effort (.333 point each) ___ AXP position permits good mobility for quick evacuation to rear ___ AXP location allows for AIR MEDEVAC	S1
NAI XX ___ Element placed on the overlay?	___ NAI XX is planned to monitor civilian population movement (.5 point each) ___ NAI planned to monitor possible reinforcement with reserve or eastern mechanized battalion forces	S2
NAI XX ___ Element placed on the overlay?	___ NAI XX is planned to monitor AGL and western MIC displacement/reinforcement to TF 1-93 sector	S2
NAI XX ___ Element placed on the overlay?	___ NAI XX is planned to monitor reinforcement from western MIP	S2
NAI XX ___ Element placed on the overlay?	___ NAI XX is planned to monitor any dismounted movement along eastern flank	S2

Overlay Element	Rationale/Justification •	Staff Officer Responsible
Key Terrain ___ Element placed on the overlay? ___ Element placed on the overlay? (.5 point each)	(.333 point each) ___ One key terrain identified provides control of dominant terrain in TF 1-93 sector ___ One key terrain identified is a potential chokepoint that may impede TF mobility ___ Key terrain has been identified in coordination with the S3, S2 and ENG	AS2
Support by Fire (SBF) ___ Element placed on the overlay?	(.333 point each) ___ SBF orientation provides effective fires to critical operations ___ SBF position is within the appropriate distance given the maximum effective weapons range ___ Fire support action is synched to queue a radar when beginning breaching operations	S3
Decision Point (DP) ___ Element placed on the overlay?	(.5 point each) ___ DP location triggers maneuver events at the maximally effective time/place, given the mission objectives ___ DP location allows for maximum flexibility for fighting a thinking enemy	S3
TAI A ___ Element placed on the overlay?	___ TAI location focused on any mobile/mechanized defense forces forward in sector (.5 point each) ___ TAI could also be displaced to the east and account for possible delay position for armored recon platoon	AS3
TAI B ___ Element placed on the overlay?	___ TAI location anticipates AT repositioning to attack by fire position	AS3
Combat Trains Command Post (CTCP) ___ Element placed on the overlay?	(.333 point each) ___ CTCP position is located where it can provide support to the close fight ___ CTCP location has good cover/concealment ___ CTCP allows for follow-on support to maneuver in future phases of the operation	S4

Overlay Element	Rationale/Justification	Staff Officer Responsible
Unit Maintenance Collection Point (UMCP) ___ Element placed on the overlay? (.333 point each)	(.2 point each) ___ UMCP position has good cover and concealment for on site repair and mobility for evacuation as necessary ___ UMCP is co-located with or in the vicinity of TF 1-93's combat trains ___ UMCP has good lateral route access for mobility ___ UMCP is on level, firm ground ___ UMCP location has enough area for dispersion of assets;	S4
Logistics Release Point (LRP) ___ Element placed on the overlay?	(.5 point each) ___ LRP position is a reasonable distance from maneuver to supply Class 3 and 5 ___ LRP in covered/concealed position to reduce soft target vulnerability	S4
Alternate Supply Route (ASR) ___ Element placed on the overlay?	(.5 point each) ___ ASR location preserves resupply capability to maneuver forces ___ ASR provides resupply flexibility; reduces MSR traffic and congestion (with possible displaced civilian traffic)	S4
Smoke ___ Element placed on the overlay?	(.5 point each) ___ Smoke at this location will mask TF 1-93 maneuver and protect movement to attack positions ___ Smoke location is coordinated with S2 projections for weather/wind direction	FSO/CHEMO
Target Reference Points XX, XX, and XX (TRPs) ___ Element (TRP XX) placed on the overlay? ___ Element (TRP XX) placed on the overlay? ___ Element (TRP XX) placed on the overlay?	(.25 point each) ___ TRP positions are located at easily identifiable landmarks ___ TRP positions support easy adjustment/shifting of fires ___ TRP positions support the maneuver concept with indirect fire ___ TRP positions are located at an appropriate range, given the weapon system available	FSO

Overlay Element	Rationale/Justification	Staff Officer Responsible
Mortar position ___ Element placed on the overlay?	___ Provide responsive fire support (smoke or HE) to breaching efforts, OBJ PITBULL and flank protection to west	FSO
Friendly Obstacle Plan ___ Element placed on the overlay?	(.5 point each) ___ The placement of FASCAM allows for responsive obstacle support to seal flanks/deny *enemy mobility into sector* ___ Obstacle location is synchronized with fire support and maneuver	ENG
ADA Asset Location ___ Element placed on the overlay?	(.333 point each) ___ ADA position allows for adequate air defense coverage, given the type of asset available ___ ADA position disperses friendly assets, reducing vulnerability ___ ADA position provides overlapping zones of coverage	ADO
Retrans location ___ Element placed on the overlay?	___ Retrans location will provide uninterrupted communications throughout the fight ___ Placed on high ground to provide LOS commo via FM	SIGO

Maximum number of overlay element points = 21

Actual number of overlay element points earned =

Maximum number or rationale/justification points = 21

Actual number of rationale/justification points earned =

TOTAL maximum number of points = 42

TOTAL actual number of points earned =

$$\text{Score} = \frac{\text{TOTAL actual number of points earned}}{\text{TOTAL maximum number of points}}$$

Phase III - FPOL

Overlay Element	Rationale/Justification	Staff Officer Responsible
Command Posts (CPs) (Main & Rear) ___ Element (Main CP) placed on the overlay? ___ Element (Rear CP) placed on the overlay? (.5 point each)	___ CP positions are within optimal communication range (.125 point each) ___ CP positions allow them to stay in contact during critical operations ___ CP positions are tactically defendable ___ CP positions are located where cover and concealment are offered ___ CP positions support complex passage of lines requirements ___ CP positions allow TF 1-93 to control the FPOL without interfering with TF 1-14 operations ___ CP positions allow good coordination with TF 1-93 (the stationary unit) ___ CP locations are supported by indirect fires and air defense assets	XO
Civilian Collection Point (CCP) ___ Element placed on the overlay?	___ CCP position is out of harm's way (.2 point each) ___ CCP position has a good approach to logistics supply ___ CCP position is not so far away to make civilians fearful that they will not return home when all is safe ___ CCP position is off the main supply route, limiting congestion caused by displaced civilians ___ CCP position is located with ready access to a water supply	S1
Ambulance Exchange Point (AXP) ___ Element placed on the overlay?	(.5 point each) ___ AXP position can support both TF 1-93 (the stationary unit) and TF 1-14 (the passing unit) ___ AXP location allows for AIR MEDEVAC	S1
NAI XX ___ Element placed on the overlay?	___ NAI allows TF to anticipate and prepare for enemy counterattack (.333 point each) ___ NAI allows TF to observe for enemy movement on flanks ___ NAI is linked with the maneuver and engineer plans	S2
Key Terrain ___ Element placed on the overlay?	___ Key terrain identified is the best location for controlling OBJ PITBULL (.333 point each) ___ Key terrain identified is the best location for limiting enemy access into the area and securing the safe passage of TF 1-14 (the passing unit) ___ Key terrain has been identified in coordination with the S3 and ENG	AS2

Overlay Element	Rationale/Justification	Staff Officer Responsible
Release Point X (RPX) ___ Element placed on the overlay?	___ RP position ensures close proximity to lanes 20 and 21 and to subsequent attack positions	S3
Assembly Area XX and Route XX to move to lanes 20, 21 ___ Element (AA) placed on the overlay? ___ Element (Route) placed on the overlay? (.5 point each)	___ AA position is in a covered/concealed location (.5 point each) ___ AA location is large enough for TF 1-14 (the passing unit) to assemble/prepare for the passage of lanes	S3
Attack Positions XX and XX ___ Element (Atk Pos XX) placed on the overlay? ___ Element (Atk Pos XX) placed on the overlay? (.5 point each)	___ Attack positions are the last covered/concealed locations from which to launch an attack forward in the sector	S3
Battle Handoff Line (BHL) ___ Element placed on the overlay?	___ Clear designation of BHL (at Phase Line Mercury) ensures that TF 1-14 (the passing unit) has control at that point forward	S3
Contact Point XX ___ Element placed on the overlay?	(.333 point each) ___ Contact point XX serves as a designated linkup point for reconnaissance by TF 1-14 (the passing unit) and coordination for follow-on passage ___ Contact point XX location is easy to identify ___ Contact point XX location is protected by cover/concealment	AS3

Overlay Element	Rationale/Justification	Staff Officer Responsible
Re-arm, re-fuel, re-supply point (R3P) ___ Element placed on the overlay?	(.5 point each) ___ R3P position supports operations without obstructing TF 1-14 (the passing unit) progress ___ R3P position allows support of TF 1-14 (the passing unit), as well as TF 1-93	S4
Unit Maintenance Collection Point (UMCP) ___ Element placed on the overlay?	___ UMCP allows for recovery of disabled equipment (.5 point each) ___ UMCP is in a relatively flat, concealed area with good access to routes to rear as needed	S4
Smoke ___ Element placed on the overlay?	(.5 point each) ___ Smoke at this location will mask TF 1-93 maneuver and protect movement to attack positions ___ Smoke location is coordinated with S2 projections for weather/wind direction	FSO/CHEMO
Target Reference Points XX, XX, and XX (TRPs) ___ Element (TRP XX) placed on the overlay? ___ Element (TRP XX) placed on the overlay? ___ Element (TRP XX) placed on the overlay? (.333 point each)	(.166 point each) ___ TRP positions are located at easily identifiable landmarks ___ TRP positions support easy adjustment/shifting of fires ___ TRP positions support the maneuver concept with indirect fire ___ TRP positions are located at an appropriate range, given the weapon system available ___ TRP positions are synchronized with maneuver and with the engineering obstacle plan ___ TRP positions support deconfliction of responsibility for indirect fire (TF 1-93 or TF 1-14) while TF 1-14 is on the move to their area	FSO
Combat observation lasing team (COLT) Team Positions ___ Element (first COLT team) placed on the overlay? ___ Element (first COLT team) placed on the overlay? (.5 point each)	(.5 point each) ___ COLT Team positions provide laser directed fire support for high-priority targets ___ COLT Team positions have good visibility to high speed avenues of approach	FSO

Overlay Element	Rationale/Justification	Staff Officer Responsible
Coordinated Fire Line (CFL) ___ Element placed on the overlay?	(.5 point each) ___ CFL provides clear direction for the unit assuming fire support mission ___ CFL is along clearly defined terrain features where possible	FSO
Friendly Obstacle Plan ___ Element placed on the overlay?	(.5 point each) ___ Scatmines or rapid obstacle emplacement on the flanks will protect against enemy counterattack ___ Obstacle location is synchronized with fire support and maneuver	ENG
ADA Asset Location ___ Element placed on the overlay?	(.333 point each) ___ ADA position allows for adequate air defense coverage, given the type of asset available ___ ADA position disperses friendly assets, reducing vulnerability ___ ADA position provides overlapping zones of coverage	ADO
Decontamination Point ___ Element placed on the overlay?	(.5 point each) ___ Decon point is far enough forward to support TF 1-93 maneuver forces, while remaining clear of persistent NBC threat ___ Decon point is synchronized with maneuver/terrain management ___ Decon point is located with ready access to water supply	CHEMO

Maximum number of overlay element points = 19

Actual number of overlay element points earned =

Maximum number or rationale/justification points = 19

Actual number of rationale/justification points earned =

TOTAL maximum number of points = 38

TOTAL actual number of points earned =

$$\text{Score} = \frac{\text{TOTAL actual number of points earned}}{\text{TOTAL maximum number of points}}$$

Appendix I

Demographic Survey

General Information (please fill out the table below by typing your response in the right-hand column)

Question	Answer
1. Age:	
2. Staff Position in AC3DL (e.g., XO):	
3. Basic Branch (e.g., AR, IN, FA, etc.):	
4. List Other Basic Branch Experience: (indicate months of experience in each branch)	
5. Current Rank:	
6. Current Duty Position:	
7. Months in Current Duty Position:	
8. Years of Regular Army Experience:	
9. Highest Enlisted Rank Achieved: (type "N/A" if question is not applicable to you)	

Prior Company Command (please fill out the table below, where applicable; select Yes or No by *italicizing* it):

COMPANY NAME	Months as Commander	CTC Rotation?
10a.		Yes No
10b.		Yes No
10c.		Yes No

Prior Staff Experience (please fill out table below, where applicable; select Yes or No by *italicizing* it):

Staff Position (e.g., Company XO)	Months in Position	CTC Rotation?	Deployed?
11a.		Yes No	Yes No
11b.		Yes No	Yes No
11c.		Yes No	Yes No
11d.		Yes No	Yes No

GO ON TO THE NEXT PAGE

If you have NOT had prior staff experience, please skip to Question 17. If you listed prior staff positions in the table above, please go on to Question 12.

12. While serving in the above-listed staff positions, did you participate in a COA Analysis (i.e., war game)? (please *italicize* your answer)
    Yes No

13. Where have you conducted COA Analysis? [you may choose more than one - please *italicize* your selection(s)]
    Home-Station TX CTC Rotation Deployment

14. Have you used computer simulation to conduct COA Analysis? (please *italicize* your selection)
    Yes No

15. Have you used digital displays during COA Analysis? (please *italicize* your selection)
    Yes No

16. Have you participated in COA Analysis as part of an Abbreviated MDMP Process?
    Yes No (please *italicize* your selection)

17. Other Military Courses Taken (please *italicize* your selections):
    Air Borne/Air Assault
    Ranger/Special Forces
    BMOC/Other CSS
    SPLC
    TC3/NBC Defense/Other (please list "Other" Courses below)

18. Have you had experience working with anyone else in the AC3DL course prior to taking the course?
    Yes No (please *italicize* your selection)

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Appendix J

General Design Guidelines for Scenario-Specific Assessments

The wargaming process and outcome assessments developed in the present research are widely applicable, but their particular instantiation is scenario-specific, and must be so if the goal is to assess situated task performance (as opposed to abstract, general constructs, such as general intelligence or working memory). For this reason, general guidelines for designing wargaming process and outcome assessments for specific scenarios are outlined below. Assessments analogous to those used in the present research can, with some effort, be developed to assess the same elements of the wargaming framework (e.g., battlefield visualization) using different scenarios.

General Guidelines

The development of scenario-specific assessments of wargaming effectiveness requires the joint participation of an assessment/measurement subject matter expert and one or more Army subject matter experts. The assessment/measurement expert must be capable of conceptualizing assessment tools that do not fit well with traditional psychometric models and able to communicate arcane assessment criteria to a non-expert. The Army expert(s) must have relatively recent Army experience and be current with new doctrine and relevant organizational changes in the Army. He (she) must also be capable of articulating the observable behaviors associated with effective/ineffective performance. A current Army professional is not ideal for assessment development due to the time demands involved, but recently retired Army officers are a great resource and often willing to help. Contractors working as Army instructors are also a very helpful resource as they have extensive experience with observing, thinking about, and evaluating performance.

Developing an Integrated Plan/Overlay Exercise

Assessing the degree of integration and synchronization in the mission plan refined by wargaming requires determining (a) the graphics must be present in the plan overlay in order to demonstrate that integration across BOSs has been accomplished and (b) the rationale criteria that should be used to position these graphics.

Determining the graphics that must be present in the integrated overlay involves, essentially, mentally (or literally, if there is access to enough experts) wargaming the scenario for all aspects of the mission, including combat support (CS) and combat service support (CSS) battlefield operating systems (BOS). For assessing the staff integration of combined arms units, special attention must be paid to CS and CSS, such as obstacles, supply routes, decontamination points, etc., which tend to get left out of wargaming and are developed in a stove-piped manner to produce the task force operations order. Additional important graphics to consider include command posts, key terrain, and target reference points. Non-maneuver officers can be especially helpful in determining these critical graphics because they have considerable experience with CS or CSS aspects of operations

Determining the rationale criteria used to position the graphics must come from consultation with doctrine and Army experts. To a noteworthy degree, these criteria can be transferred across scenarios, provided the critical graphics present in the overlays are the same.

Materials Required:
1) Detailed brigade operations order
2) Commander's planning guidance and intent
3) Task force course-of-action statement and sketch
4) Map of area
5) Doctrinal materials (e.g., *FM 3-0, Operations; FM 3-90, Tactics*)

Developing a Situation Awareness Exercise

Assessing battlefield visualization/situation awareness using a modified decision support matrix (DSM) requires determining ahead of time (again, either by mental or actual wargaming of the scenario) the number and map position of the critical (a) named areas of interest (NAI), (b) target areas of interest (TAI), (c) and decision points (DP) that should be included in the matrix, as well as (d) the indicators of enemy decisions, and (e) the friendly actions that must be taken if particular enemy decisions are made. (Included below is a blank representation of an example modified DSM that can be used as a template.) Maneuver officers are especially helpful making these determinations, as they have considerable experience developing maneuver schemes. Note, however, that a sampling of multiple experts, especially if they come from different branches, may produce a different selection of elements to include in the DSM. Justifiable decisions must be made as to what should serve as a "correct" answer in each cell of the matrix.

Materials Required:
1) Situation Template
2) Task force course-of-action statement and sketch
3) Modified Combined Obstacle Overlay
4) Map of area
5) Doctrinal materials (e.g., FM 3-0, *Operations*; FM 3-90, *Tactics*)

Enemy Indicators	NAI (Center of Mass)	TAI (Center of Mass)	DP (Center of Mass)	Friendly Action

Developing a Think Like a Commander (TLAC) Checklist

Assessing adaptivity of team thought by evaluating examinee responses to TLAC probe questions requires creating the probe questions and determining effective and ineffective responses to these questions, to be used as anchors for an observer rating scale.

The basis of the probe questions is the eight TLAC themes (listed below). The kind of thinking that questions based on each theme required is also listed below. The listing of these requirements provides guidance for how the scenario-specific probe questions should be designed via a combined effort of Army and assessment/measurement experts.

Creating probe questions at an adequate difficulty level can be tricky. They should be difficult enough to challenge the examinee to think beyond what can be regurgitated from the brigade operations order, but not so difficult that they require significant time to generate a response. Examinees should be able to demonstrate flexibility of thought without getting bogged down in the weeds, otherwise the process will take too long.

Determining effective and ineffective responses to the probe questions requires consultation with doctrine and subject matter experts. A combination of maneuver and non-maneuver experts is the best arrangement, if possible.

Materials Required:
1) Detailed brigade operations order
2) Task force course-of-action statement and sketch
3) The eight TLAC themes (these themes and the nature of the questions associated with each are listed below)
4) Situation Template
5) Map of area
6) Doctrinal materials (e.g., *FM 3-0, Operations; FM 3-90, Tactics*)

The Eight TLAC Themes and the Nature of their Probe Questions

Keep a Focus on the Mission and Higher's Intent

Probe questions under this theme challenge the students to apply their understanding of mission and intent to address a change in events

Model a Thinking Enemy

Probe questions under this theme challenge the students to (a) apply their knowledge of the enemy to consider branches to the COA or alternative COAs; (b) describe how they would commit forces if they were the defending enemy (rather than attacking force); or (c) describe how they would handle enemy deployment of NBC weapons.

Consider Effects of Terrain

Probe questions under this theme challenge the students to (a) apply their knowledge of the terrain to consider alternative actions to accomplish the mission if terrain changes (e.g., a new obstacle is discovered, concealment is destroyed by enemy countermobility, key pass is blocked, civilian demonstration takes place); (b) consider rates of movement for various types of

terrain under differing environmental conditions; and (c) apply their knowledge of terrain to justify maneuver COAs on the basis of terrain available to them/to the defender.

Use All Assets Available

Probe questions under this theme challenge the students to (a) apply their knowledge of the range of assets available to address a change in their expected level of resources; and (b) demonstrate general knowledge of the capabilities or functions/assets from other BOS's, such as CS and CSS, so that these assets can be appropriately positioned/effects maximized.

Consider Timing

Probe questions under this theme challenge the students to apply their sense of timing to synchronize likely battlefield events (e.g., overlapping casualty evacuation (CASEVAC) with fires, how long to take care of CASEVAC before fires can be issued, passage of lines for a maneuver battalion through limited passage lanes)

See the Big Picture

Probe questions under this theme challenge the students to (a) apply their knowledge of the entire Bde mission to recognize what implications the success (or failure) of other TF units has for their own TF mission and vice versa; and (b) respond to the destruction of their own mobility reserve.

Visualize the Battlefield

Probe questions under this theme challenge the students to (a) describe the impacts of terrain (or the enemy) on friendly mobility/maneuver; (b) describe fields of fire for friendly or enemy weapons systems; (c) identify where secondary positions or alternate locations exist for someone defending in depth. NOTE – This list is not in any way exhaustive. Probe questions for the above 6 TLAC themes, and the below theme "Consider Contingencies and Remain Flexible" can all fall under the rubric of "Visualize the Battlefield."

Consider Contingencies and Remain Flexible

Probe questions under this theme challenge the students to (a) respond effectively to unexpected events; (b) consider NAI/TAIs to flexibly assess and respond to where the enemy might go/what the enemy might do; and (c) consider seams/flanks in the formation as possible vulnerabilities.

Developing a Team Communication Checklist

Assessing team communication by evaluating staff information sharing during wargaming requires determining (a) which wargaming tasks to target for observation; (b) which staff officers should be sharing information during those tasks; and (c) what information must be shared in order for the task to be completed effectively.

Determining the team communication target tasks can be tricky. Although a comprehensive list of tasks to be completed during brigade-level wargaming has been developed (Mullen et al., 1997), staffs often do not complete many of these tasks during wargaming (if, in operational environments, they war game at all). That said, this list, modified for task-force-level planning, can serve as the basis for selecting the team communication target tasks. A subset of this list of 42 wargaming tasks can make useful points of observation (routine-event targets) for staff information sharing. Wargaming tasks of special interest are those identified as needing emphasis in the Center of Army Lessons Learned analyses of trends in Combat Training Center command and control team performance (e.g., integrate fire support with maneuver and priorities). In addition, tasks that have some likelihood of being completed during the war game should also be selected. For example, some of the 42 wargaming tasks are best used for defensive operations (e.g., determine ways and means to separate attacking enemy echelons) and so should not be used when the staff is wargaming an offensive operation. Determining the likelihood that a task will be attempted during wargaming can be aided by comparing the synchronization matrices of previous wargame s using the same scenario, if available, to the brigade operations order (additional elements in the synch matrix were tasks completed during wargaming), or by observing the tasks accomplished in other war games, or consulting with subject matter experts. Note that doctrine is not helpful in determining the likelihood that a task will be attempted. This is because doctrine represents what should ideally be done, rather than what is actually done.

Determining the staff officers who should share information for each wargaming task is made easy by the research conducted in the present research. The necessary staff officers for each task are listed below, along with the 42 task-force-level wargaming tasks themselves. Note that this list focuses on core staff officers, as is therefore not exhaustive. It also may require some modification for different kinds of units. This list is, however, doctrine based and verifiable.

Determining the information shared for each task involves exploration of doctrine and consultation with subject matter experts. A combination of maneuver and non-maneuver experts is the best arrangement, if possible. The information shared is somewhat portable across scenarios, provided the wargaming tasks identified for each scenario are the same.

Materials Required:

1) Detailed brigade operations order
2) Task force course-of-action statement and sketch
3) List of the 42 wargaming tasks to be accomplished at the task force level (included below)
4) Map of area
5) Modified Table of Organization & Equipment or a SMARTBOOK reference of critical BOS systems and their capabilities
6) Recent Center of Army Lessons Learned trends analyses

The 42 Wargaming Tasks to be Accomplished at the Task Force Level (see Mullen et al., 1997)

1. Clearly identify the commander's intent and vision of the battle.
   XO, S1, S2, S3, S4, SIGO, FSO, ADO, ENG
2. Determine the command and control requirements for minimizing the effect of destruction of friendly CPs.
   XO, S3, SIGO
3. Determine or refine the CCIR.
   XO, S1, S2, S3, S4, SIGO, FSO, ADO, ENG
4. Determine critical events and decision points.
   XO, S1, S2, S3, S4, SIGO, FSO, ADO, ENG
5. Determine command post locations and composition to support current and planned tactical operations.
   XO, S1, S2, S3, S4, SIGO, ENG
6. Assess the potential effect of battle intensity on Soldier and leader will to fight.
   XO, S1
7. Determine HPTs.
   XO, S2, S3, S4, FSO, ADO, ENG
8. Determine optimal times and locations to maximize enemy casualties and force destruction.
   XO, S2, S3, S4, FSO, ADO, ENG
9. Determine ways and means to separate attacking enemy echelons.
   XO, S2, S3, S4, FSO, ADO, ENG
10. Determine ways and means to force enemy elements into areas where the commander wants them.
    XO, S2, S3, S4, FSO, ADO, ENG
11. Identify expected enemy air or helicopter threats.
    S2, ADO
12. Determine optimal employment of intelligence collection assets.
    XO, S2, S3, S4, SIGO, FSO, ADO, ENG
13. Define branches and sequels to the maneuver scheme.
    XO, S2, S3, S4, SIGO, FSO, ADO, ENG
14. Identify triggers for the initiation of direct and indirect fires.
    S2, S3, S4, FSO, SIGO, ENG
15. Determine route prioritization for movement.
    S2, S3, S4, ADO, ENG
16. Define task organization requirements.
    XO, S1, S2, S3, S4, SIGO, FSO, ADO, ENG
17. Define force protection criteria.
    XO, S1, S2, S3, S4, SIGO, FSO, ADO, ENG
18. Determine effect of limited visibility on combat, CS, and CSS operations.
    XO, S2, S3, S4, FSO, ADO, ENG
19. Integrate fire support with maneuver and priorities.
    S3, S4, FSO
20. Update HPTL.
    XO, S2, S3, FSO, ADO, ENG

21. Synchronize lethal and nonlethal fires to support task force ISR operations.
    S2, S3, S4, FSO
22. Synchronize lethal and nonlethal fires to support task force offensive operations.
    S3, S4, FSO
23. Develop an observation plan that assigns (a) responsibilities to target acquisition systems; and (b) observers for the employment of indirect fires against designated targets and determination of damage assessments.
    S2, S3, SIGO, FSO
24. Verify sensor taskings to provide targetable intelligence in a timely manner for HPTs.
    S2, S3, FSO
25. Assess potential enemy actions against the task force's efforts to bypass or overcome obstacles.
    S2, S3, FSO, ENG
26. Define reconnaissance requirements to identify points of penetration into enemy obstacles and river crossing sites.
    S2, S3, S4, FSO, ENG
27. Integrate engineers into maneuver formations to maintain momentum, with the bulk of mobility assets with the breach force.
    S3, S4, FSO, ENG
28. Determine FASCAM employment.
    S2, S3, FSO, ENG
29. Define emplacement criteria for obstacles and mines to protect the task force flanks and block enemy counterattacks.
    S2, S3, S4, FSO, ADO, ENG
30. Determine requirements and priorities for force protection, to include survivability positions for vehicles, weapons, systems, and equipment.
    XO, S2, S3, S4, FSO, ENG
31. Determine air defense support and priorities.
    XO, S2, S3, S4, FSO, ADO
32. Define early warning requirements.
    S2, S3, ADO
33. Determine air defense decision points.
    XO, S2, S3, FSO, ADO, ENG
34. Determine air defense movements in support of task force operations.
    S3, ADO
35. Determine direct and indirect fire systems in an air defense role.
    S2, S3, FSO, ADO
36. Define air defense fratricide prevention criteria.
    XO, S3, ADO
37. Determine the adequacy of the area for CSS operations.
    XO, S1, S2, S3, S4, ENG
38. Determine transportation requirements and priorities.
    XO, S3, S4, ENG
39. Determine medical support requirements.
    XO, S1, S4
40. Identify points in the battle when surge requirements are likely to be generated.

XO, S2, S4

41. Determine tactical restrictions on CSS operations.
    XO, S3, S4, ENG
42. Compare required and available CSS capability to identify shortfalls and ways and means to mitigate the effect of these shortfalls.
    XO, S2, S3, S4, SIGO, FSO, ADO, ENG